Ethereum Blog



**DApps** 

# How to build server less applicat for Mist



Posted by Alex Van de Sande on ② July 12th, 2016.

Alex Van de Sande

applications that require a STEM degree to understand, but it aims to be one pillar of a different architecture for applications on the world wide web. With this post we Sande is an UX will try to elucidate how this can be done and give some basic examples on how to designer at the start building a decentralized app.

Foundation

#### Who is this for?

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This text is intended at those who have a basic understanding of web technology and

how to build a simple javascript and html app, and want to convert these skills into practice part 3:

building apps for the Ethereum ecosystem.

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bank on the

blockchain

## How can apps run without servers?

Ethereum in

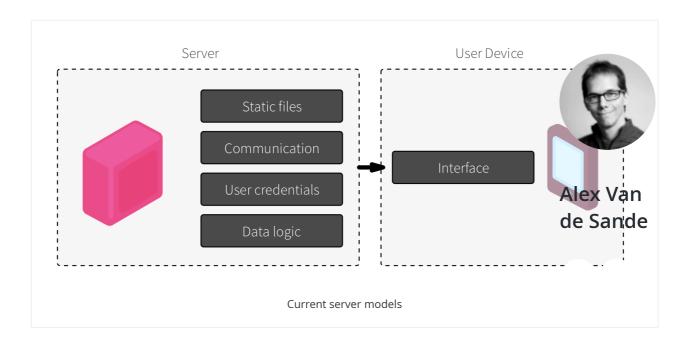
Currently servers in web apps do much more than what they were originally intended to. Besides serving static web pages, they also keep private information, handle user better democracy

authentication and deal with all the complicated ways in which data is analyzed and

lines of code

saved. All the user computer does – a device which would be considered a super

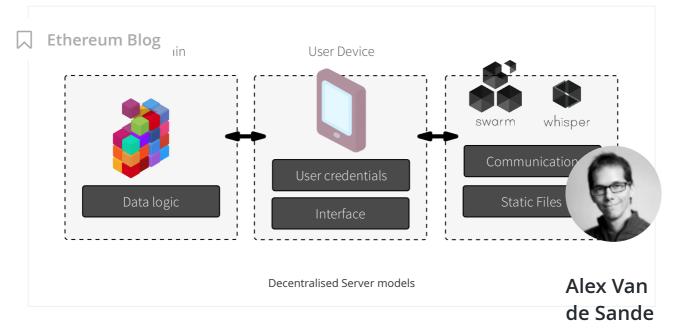
web was invented – is to load and display that information to the user.



Alex Van de Instead, a more decentralized architecture would allow a much more modular Sande is an UX approach, in which different machines and different protocols would handle great in the tasks, some on the user's side and some in specialized machines deployed on a peer Foundation to peer network. Therefore all the Data logic (what gets saved, who saves it, how to solve conflicts etc) is handled by smart contracts on the blockchain, static files are served via Swarm and realtime communication over Whisper. The user device keeps the user authentication and runs the application interface.

practice part 3:

Doing this would remove the danger of data breach and attacks as there are the bank on the single nodes keeping tons of unencrypted data, while also removing the load and cost of serving apps by distributing it across the network. Since all those protection are practice part 2: decentralized, anyone can connect to the network and start providing a specialized how to build a service: if the user is browsing from a powerful laptop, for instance, they retraited so service in under a 100 static files to network neighbors.



A decentralized architecture also encourages innovation: since the interface is detached from the data, anyone can come up with a new interface to the ne app, creating a more vibrant and competing ecosystem. Arguably, one of the most Alex Van de interesting and innovative periods in Twitter history was when it served mostly as a Sande is an UX central data hub and anyone could build their Twitter Application. designer at the Ethereum

## See it working

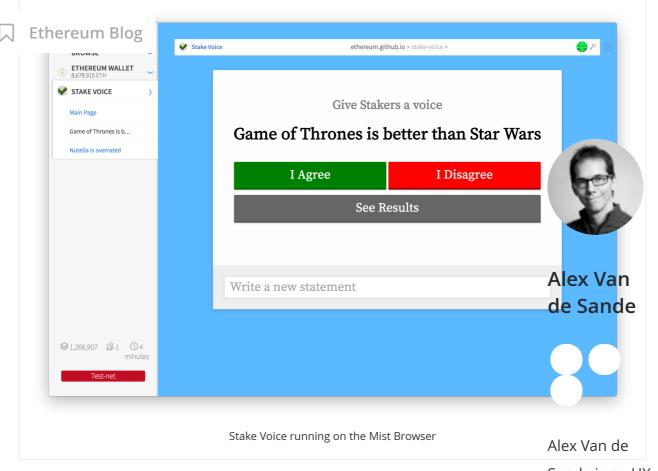
If you want to experiment with the app before learning it, we recommend you LATEST POSTS download Mist and read our introductory tutorial to how to install the app and run Ethereum in it. If you just want to see the whole app instead, you can download it directly if expanse the

Stake Voice Github repository.

irectly ide pant 结he how to build your own transparent bank on the blockchain

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## Let's get to it

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We are going to build a very simple application called "Stake Voice". The idea is to allow ether stakers to vote on anything they want, and the app will tally the total ether **LATEST POSTS** balance of all those who agree or disagree with the statement.

Ethereum in

The app underlying contract is written in Solidity, a javascript-like language and is very simple:

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```
Ethereum Blog erVote {
      event LogVote(bytes32 indexed proposalHash, bool pro,
  address addr);
      function vote(bytes32 proposalHash, bool pro) {
          if (msg.value > 0) throw;
          LogVote(proposalHash, pro, msg.sender);
      7
      function () { throw; }
  }
```



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The first line sets up the contract name and the second creates an event "LogVote", which will output in the log the following:

		Alex Van de
•	a hash of the proposal being voted on	Sande is an UX
•	if the voter agrees or disagrees with it	designer at the
		Ethereum
	the address of the voter	Foundation

The function "vote" will then fire the log, which the application later will country to also the function to the second s has a check that no ether can be sent accidentally. The "anonymous" function is executed when any ether is deposited on the smart contract and will the Practice part 3: how to build your automatically reject it. own transparent

bank on the

blockchain

If you want to learn more about coding in Solidity we recommend you start on the Ethereum in ethereum solidity tutorials, read the official documentation page and try it on your

browser using the online compiler.

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how to build a

That's essentially it: you choose a hash, choose a side and execute Vote()!iso how does this translates into a polling app?

## Sawawlass Architecture

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Following the principle of KISS, we are doing the minimum product possible that is still usable, meaning we won't be using databases for storing proposals or using any feature that requires anything other than vanilla javascript and pure html.

So we will use the URL of the app itself to keep the proposal text, and we want to display it to the user and generate a hash that can then be used to check the votes.

Alex Van

The users can use social media to share which proposals they want to debate or de Sande simply use direct links.

```
// On the initial startup function:
                                                              Alex Van de
proposal = decodeURI(getParameterByName('proposal'));
                                                              Sande is an UX
                                                              designer at the
// get parameter function
                                                              Ethereum
function getParameterByName(name, url) {
                                                              Foundation
    if (!url) url = window.location.href;
    name = name.replace(/[\[\]]/g, "\\$&");
    var regex = new RegExp("[?&]" + name + "(=
                                                              LATEST POSTS
([^{\&\#}]*)[\&|\#|\$)"),
                                                              Ethereum in
         results = regex.exec(url);
                                                              practice part 3:
    if (!results) return null;
                                                              how to build your
    if (!results[2]) return '';
                                                              own transparent
    return decodeURIComponent(results[2].replace(/\+/g,
}
                                                              blockchain
                                                              Ethereum in
                                                              practice part 2:
```

## Start with basics

So grab your favorite html framework and get a basic website on your loue made and open it on Mist. All pages in Mist have access to a javascript object called web3

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better democracy in under a 100 u will be working the most. First thing we need to do is check if Ethereum Blog webs is present or not:

```
Function init() {
...
if(typeof web3 == 'undefined') {
    // Alert the user they are not in a web3 compatible browser
    return;
}
Alex Van
de Sande
```

Some application developers might want to load their own web3 object, to guarantee

forward compatibility. To do that, just add just before </body> tag:

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**<script** Foundation

src="https://raw.githubusercontent.com/ethereum/web3.js/0.16.0/dist/
</script>

#### **LATEST POSTS**

**◆** Ethereum in

practice part 3:

how to build your And then add this on your initial function to load your own custom web3 provider:
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lines of code

```
Ethereum Blog b3 support
  if(typeof web3 !== 'undefined' && typeof Web3 !== 'undefined')
   {
      // If there's a web3 library loaded, then make your own
  web3
      web3 = new Web3(web3.currentProvider);
   } else if (typeof Web3 !== 'undefined') {
      // If there isn't then set a provider
      web3 = new Web3(new
                                                           Alex Van
  Web3.providers.HttpProvider("http://localhost:8545"));
                                                           de Sande
  } else if(typeof web3 == 'undefined') {
      // Alert the user he is not in a web3 compatible brower
      return;
  }
```

### Load information from the blockchain

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You checked you are connected to a blockchain, but which one? Is it the maindation ethereum network? Maybe a testnet or a private network? Maybe it's a fork in the future and your chain is a brand new one. The best way to check this is to ARESTITEDETS contract address you want to load has any code on it.

Luiereumm

practice part 3:

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Furthermore, to execute a contract you need to know two basic things: it's address and the ABI, which will be a json encoded file containing interface information.

blockchain

Ethereum in practice part 2: how to build a better democracy in under a 100 lines of code

```
thereum Blog Address = '0x1e9d5e4ed8ef31cfece10b4c92c9057f991f36bc';

var contractABI = [{"constant":false,"inputs":
    [{"name":"proposalHash","type":"bytes32"},
    {"name":"pro","type":"bool"}],"name":"vote","outputs":[],"type":"fun
    {"anonymous":false,"inputs":
    [{"indexed":true,"name":"proposalHash","type":"bytes32"}
    {"indexed":false,"name":"pro","type":"bool"},
    {"indexed":false,"name":"addr","type":"address"}],"name":"Logvote","
    Alex Van
    de Sande
```

Now that you have those, you can check if the contract exist on the startum results in the startum results.

```
// Load the contract
web3.eth.getCode(contractAddress, function(e, r) {
   if (!e && r.length > 3)
        loadContract();
})
Alex Van de
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Foundation
```

#### **LATEST POSTS**

You can even run this command recursively, to try connecting to it again using another address (in case you are actually on the testnet). Once you have found your contract own transparent you can load it up here:

bank on the

#### □ Ethereum Blog

You are using the web3 object to create a new a javascript object that will be able to execute all the ethereum commands directly from the browser. If you want to load only a single instance of the contract, then you can even do it in one line:

ethervote = web3.eth.contract(contractABI).at(contractAdATexVan

de Sande

## Identify the user

Knowing the user's account reveals a lot of information about the user: how much Alex Van de ether and any other tokens it has on its balance, and their transaction historyes an UX having all apps know this by default would create a super cookie and would be an Ethereum unacceptable invasion of privacy. On the other hand, requiring the user to create an Foundation user account with login information for each site is not only a pain for the user, but also puts your private information in control of third parties, which creates giant honey LATEST POSTS pots that can be breached by hackers.

Ethereum in practice part 3:

As a result of this dilemma most users have most of their personal information validour authentication information handled by a half dozen billion dollar corporation.

Privacy should not be a compromise we accept in exchange of practicality. User's should be able to easily authenticate into any app while being in control of their own practice part 2: personal information.

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in under a 100

Using Mist, apps have no information about the user, until the user decides to reveal itself to the app. When you want to query what you know about the accounts, you should call the getAccounts function:

```
Ethereum Blog Accounts(function(e,accounts){
    if (!e) {
        // do something with the accounts
    }
});
```



Currently, the returning object is an array that holds simple accounts that the user has local access to, but in the future it will also hold smart contract accounts the user uses de Sande to identify themselves. This will allow the user to have access to features currently available only to centralized authenticators, like two factor authentication contracts, and to future improvements only available to smart contracts, like allowing a few trusted friends to give you access to an account for which you lost keye or having a automatic inheritance of inactive accounts.

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Each future Ethereum browser will handle how users identify themselves to the App. Foundation

In Mist we have two ways: either the user can initiate it by clicking the "connect" button

(currently it's just called a "no accounts" button) or the App can request the

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authentication by calling the "requestAccount" api.

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Attention: the accounts on this list are just one which the user claims to hold theil legur to, but the user has provided no proof of doing, therefore you can show a different UI, but don't send the user any secret information intended only to that accounts his pank on the user to prove their identity you need them to sign a message, while hist practice part 2: will also support that in the future, keep it in mind that it would force the better democracy an extra step and type their password, so you should only use that when absolutely in under a 100 necessary.

#### Votina



Once you have the contract as an object, voting is a matter of calling it from javascript.

This will pop up a Mist transaction pane, where the user will be able to check the transaction and then type their password. So first we will create two clickathat calls a vote function:

```
Alex Van de Sande document.getElementById('vote-support').addEventListener('click', function(){ vote(true'`}, false); document.getElementById('vote-against').addEventListener('click', function(){ vote(false);}, Alex Van de false); Sande is an UX designer at the Ethereum
```

Notice that one calls the function with a true parameter and the other false in function vote could be as simple as:

```
LATEST POSTS
```

```
Ethereum in
     Function vote() {
                                                                            practice part 3:
          ethervote.vote(proposalHash, support, {from:
                                                                            how to build your
    web3.eth.accounts[0]});
                                                                            own transparent
                                                                            bank on the
    }
                                                                            blockchain
                                                                            Ethereum in
                                                                            practice part 2:
"Ethervote" is the object we created before, and "vote" is one of its functions « which
                                                                            better democracy
correspond to one of the contract functions:
                                                                            in under a 100
                                                                            lines of code
```

function vote(bytes32 proposalHash, bool pro) {

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We pass the two parameters demanded by the function and then add a third object containing transaction informations, like who is it being sent from and optionally, how much gas to include or how much to pay for the gas.

Consequently this would generate a panel asking the user to confirm the them of the but most likely it will return an error because currently the web3.eth.accounts object is **Alex Van** an empty array by default, so you have to check for that and if empty, request the accounts to the user:

```
function vote(support) {
                                                               Alex Van de
                                                                Sande is an UX
     web3.eth.getAccounts(function(e,accounts){
                                                                designer at the
         // Check if there are accounts available
                                                                Ethereum
         if (!e && accounts && accounts.length > 0) {
                                                                Foundation
             // Create a dialog requesting the transaction
             ethervote.vote(proposalHash, support, {from:
accounts[0]})
                                                                LATEST POSTS
                                                                Ethereum in
           } else {
                                                                practice part 3:
             mist.requestAccount(function(e, account) {
                                                               how to build your
                  if(!e) {
                                                                own transparent
                       // Create a dialog requesting the
                                                                bank on the
transaction
                                                                blockchain
                      ethervote.vote(proposalHash, support, Ethereum in
{from: account.toLowerCase()})
                                                                practice part 2:
                  }
                                                                how to build a
             });
                                                                better democracy
                                                                in under a 100
         }
                                                               lines of code
    });
}
```

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You should only request an account once the user initiated an action: pinging a transaction out of nowhere will deservedly irritate the user and probably make him close your app. If we observe abuses from apps using this feature, we might strict requirements to when an alert will show up.

## Watch the contract

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Finally, to count up all the votes we need to watch the contract events and see what votes were cast. To do that, we have to run this function once to start wat events, after we instantiated "ethervote":

```
Alex Van de
                                            Sande is an UX
{fromBlock: 1800000});
                                            Foundation
// Wait for the events to be loaded
logVotes.watch(function(error, result){
   if (!error) {
                                            LATEST POSTS
      // Do something whenever the event happens
                                            Ethereum in
    receivedEvent(result);
                                            practice part 3:
   }
                                           how to build your
})
                                            own transparent
                                            bank on the
                                            blockchain
```

The above code will start reading all blocks from number 1.8M (when the contract was practice part 2: uploaded) onwards and then execute the received Event() function once flower this event.

Whenever a new block arrives with an event this function will be triggered again so you in under a 100 won't need to call continuously. So what would this function do?

```
Ethereum Blog = {};

Function receivedEvent(event) {

    // Get the current balance of a voter

    var bal =

Number(web3.fromWei(web3.eth.getBalance(event.args.addr),

"finney"));

    voteMap[res.args.addr] = {balance: bal, support:
    event.args.pro};
}
Alex Van
```

From the original solidity contract, you can see that the LogVote event cover three argumenst, proposalHash, Pro and Addr:

```
Alex Van de
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event LogVote(bytes32 indexed proposalHash, bool pro, addessser at the addr);

Ethereum
Foundation
```

So what this function does is that it will use the function web3.eth.getBalance to check the current ether balance of the address that voted. All balances always return the current ether balance of the address that voted. All balances always return the current ether balance of the address that voted. All balances always return the current ether balance of the address that voted. All balances always return the current ether and is not very passeful to the particular application, so we also use another included web3 function which converts that to any ether unit we want. In this case we will be using the lankey, which blockchain is a thousandth of an ether.

Ethereum in practice part 2:

de Sande

Then the function will save the balance, along with the position of the voter to be better democracy based on the address. One advantage of using a map instead of an array is that this will automatically overwrite any previous information about that same address, so if someone votes twice, only their last opinion will be kept.

buld do is identify the user and show them if they voted or not.

Ethereum Blog

## Tally up the votes

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Alex Van de

Ethereum

Finally, we should add a separate function to calculate the sums of the volumentation

calculateVotes();

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Why do we want to tally up the votes on a separate function? Because since the vote bank on the weight is based on the current balance of each account, we should recalculate the balances at every new block, event if we received no new event. To do this you can add this function that will execute automatically everytime a new block arrives: how to build a

better democracy in under a 100 lines of code

```
Ethereum Blog ter('latest').watch(function(e, result){
    if(!e) {
        calculateVotes();
     }
});
```



Finally, up to calculating the final tally. We have previously used eth.getBalance in synchronous mode, where the app would wait for the result of the previous action to de Sande proceed. Here, since we can be calling a lot of actions every block, we will use it in asynchronous mode: you call the node and execute the action whenever . \_\_p. without freezing the interface.

```
Alex Van de
                                                               Sande is an UX
var totalPro, totalAgainst, totalVotes;
                                                               designer at the
function calculateVotes() {
                                                               Ethereum
    totalPro = 0;
                                                               Foundation
    totalAgainst = 0;
    totalVotes = 0;
                                                               LATEST POSTS
    Object.keys(voteMap).map(function(a) {
         // call the function asynchronously
                                                               Ethereum in
         web3.eth.getBalance(a, function(e,r) {
                                                               practice part 3:
             voteMap[a].balance = Number(web3.fromWei(r, how to build your
'finney'));
                                                               own transparent
                                                               bank on the
             if (voteMap[a].support)
                  totalPro += parseFloat(voteMap[a].balance);
             else
                                                               Ethereum in
                  totalAgainst += parseFloat(voteMap[a].ballafice)part 2:
                                                               how to build a
             // do something cool with the results!
                                                               better democracy
         });
                                                               in under a 100
    });
                                                               lines of code
}
```

The code, what the app is doing is looping in each of the voting addresses and getting their balance, and as soon as it returns, it will either add it to the pro or against camp and sum the totals.

#### **Extra Goodies**

A few extra caveats: when there are no events, nothing will be returned an won't be calculated so you should add a timeout function on all functions that rely on Alex Van events from the blockchain.

```
setTimeout(function(){
    // If the app doesn't respond after a timeout it
probably has no votes
}, 3000);

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```

Now you can feel free to use all your current webdeveloper foo to work whatever magic you want. Use the numbers to build a nice visualization in 3D or connect to your LATEST POSTS favorite social media to share the best questions.

Ethereum in practice part 3:

Ethereum in

Mist also tries to simplify your code by providing some basic navigation and  $Ul_{build\ your}$  methods. If you want your app to be header less and occupy the full height of the mist bank on the app, just add this to your <head> tag:

```
content="transparent">
practice part 2:
how to build a
better democracy
in under a 100
lines of code
```

```
Ethereum Blog
```

ise Mist itself to navigate on your app, you can use the Mist.menu

```
for (item of propHistory) {
    if (item.length > 0 && item != 'null') {
        mist.menu.add( item ,{
        name: item,
        position: n++,
                                                           Alex Van
        selected: item == proposal
                                                           de Sande
        }, function(){
            window.location.search = '?proposal=' +
encodeURI(this.name);
        });
    }
                                                           Alex Van de
 }
                                                           Sande is an UX
                                                           designer at the
```

One great thing about ethereum is that you can expand on this simple contraction functionality without needing permission: you can add all extra functionality on separate contracts, keeping every single one of them simple and easier toatestugosts also means other people can use the contracts you created to their own expanding give new functionality. Meanwhile, all the apps use the same data and backend.

how to build your own transparent

You can play with this app live hosted on **github pages**, but this isn't the canonical blockchain source of truth, just one of the many possible interfaces to it. The same app will also Ethereum in work as a local html file on your computer or on an **IPFS network** and in the flutture it how to build a better democrace better democrace.

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Ethereum

Some ideas on how you can try:

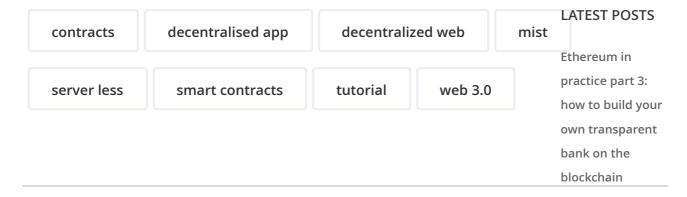
ing of currently available statements. Anyone can check them by **Ethereum Blog** seeing the sha3 of the proposal text, so you don't need permission.

- Create threaded comments where users can reply to statements and then upvote or downvote them, sort of like a decentralized stake based Res
- Instead of (or in addition to) using ether balance, you can use sor ethereum token, like The DAO or Digix Gold to weight your question differently. Since all that the original contract stores is the sender, you can **Alex Van** check all balances. Or maybe you can create your own currency the sample on reputation, karma or some other way.





Alex Van de Sande is an UX designer at the Ethereum Foundation





#### Alex Van de Sande

Alex Van de Sande is an UX designer at the Ethereum Foundation and lead of the better democracy Mist team.

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## **Ethereum Blog**



## King Flurkel

Posted at 5:31 pm July 12, 2016.

That's how we are building Locals.world! Nice to see we're on t track.







#### Mukul Thakur

Posted at 8:59 pm July 12, 2016.

damn son. I closed my eth short after reading this

Alex VanReply Sande is an UX designer at the



#### bordalix

Posted at 12:32 pm July 13, 2016.

Ethereum

Foundation

Alex, excellent post, thanks. You have a minor error in the contract.sol code in this blog post: there is a 'minus sp' on the fourth line that shared his statement in this blog post: there is a 'minus sp' on the fourth line that shared his statement in this blog post: there. The code looks fine in github. Ethereum in

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## Samuel Hawksby-Robinson

Posted at 9:52 pm July 20, 2016.

This is the best Dapp tutorial I've read. Very well put together, you need to

consider writing examples like this in the Eth docs.



#### **Michael Horowitz**

Posted at 8:22 pm August 26, 2016.

compase? b, Alex! Now how do I hook up P2P trading in Mist connected to

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Alex Van de Sande

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