Today we’ll be talking about a blockchain system called EOS.

But first the disclaimer. We are NOT part of block.one, which is the company developing EOS code. Neither are we in any way representing them. We’re a separate entity.

Before we jump into EOS, I’m going to give you a little bit of context, to help you envision how EOS fits into a bigger picture.

All of these are blockchain systems.

* Bitcoin is about simple payments.
* Ethereum is about smart-contracts. So it’s about automating those payments.
* And EOS is about real-life businesses. So it’s about turning those smart contracts into full-blown decentralized applications.

And what is a decentralized application?

To make it really simple, we might say it’s something like Uber, but without the Uber company running it. Just imagine what might happen when a customer of a company becomes a shareholder of this company by the sheer fact of using its services.

Building decentralized apps is not an easy task. A lot of things we take for granted when creating conventional web apps, are not easily available in a decentralized environment.

Let’s consider what a decentralized app needs in order to be a successful business enterprise.

* Firstly, your app needs a platform that’s cheap to run. This basically means transaction fees being low & predictable.
* Users need to be able to interact with your app without paying anything.
* And they need to be able to access it via mobile phones & web interfaces.
* They need account names, no public keys, no fancy cryptographic stuff.
* They need a procedure for account recovery, in case they are hacked, or just lose their password.
* If you build a financial app, your users will expect privacy.
* Your app needs to be able to talk to other apps, including those on other blockchains.
* It needs to be upgradeable, so that you can constantly improve it.
* And finally, it needs bug recovery, so you can handle bugs in an orderly manner.

Is this list complete? I don’t think so. We didn’t mention the single most important thing. High performance.

If we want to host real-life businesses on the blockchain, we need high performance.

And what is high performance?

* You need about 20k transactions per second, just to do Visa & MasterCard.
* Facebook does more than 50k likes per second.
* And for currency trading, you’ll need a hundred thousand transactions per second, and this is just for one currency pair.

So, imagine putting all of these on a single platform, so they can inter-operate. Well, that would require millions of transactions per second. This is a massive scale.

-- And what can the blockchain currently offer? Bitcoin does less than 4 transactions per second. Ethereum, something between 15 and 30.

-- And those two systems are extremely expensive to run. By means of inflation we are currently spending something like 12 billion USD a year to operate them.

You might say it’s just a matter of time before scaling solutions are introduced. But actually, there are only two ways to go.

* We can go off-chain, which is basically the idea behind state channels. If it works, it will only solve the problem for basic payments, not smart-contracts. So we need more than that.
* The other option is creating several sub-domains within one blockchain, or a hierarchy of multiple blockchains. This helps a bit, if you want to run a lot of small apps within the same ecosystem. However, if you want to compete with big businesses like PayPal, Uber or eBay, or if you’re into currency trading, this solves nothing. For those systems you need enormous processing power on a single blockchain, and oftentimes on a single CPU thread.

OK, it’s time to introduce EOS, and find out what it can do about all those issues.

What is EOS? I think this is the best definition, as it perfectly captures the whole purpose behind EOS.

What it says is that EOS makes decentralized apps look and behave like conventional apps.

How does EOS work?

Let’s start with Ethereum. This is what Ethereum actually looks like. We have a bare-bone computer and we have some apps trying to run on top of it.

They have a tough job to do, because apart from some basic stuff, like the ability to send funds & maybe store a little bit of data, they need to take care of pretty much everything else.

And because everything is being implemented in the application layer, it’s being done within relatively inefficient scripting environment. Which makes it really hard.

This might explain why most of what we have right now in the crypto-space are just prototypes with quite horrible UX. Developers don’t get to spend their time on building business logic and user interfaces. Instead, they are stuck on figuring out the low-level stuff, things like data storage, account permissions or inter-app communication.

Furthermore, even if some generic solutions eventually emerge as a result of these efforts, they will be expensive to use, as every single line of their code will consume gas.

Actually, the whole thing reminds me of trying to build a mobile app on a smart-phone without having Android or iOS at your disposal.

So what are we missing here?

-- Right, we need a blockchain operating system.

And this is what EOS brings to the table. EOS is an operating system for running decentralized applications. Actually, it’s both. It’s a computer and an operating system on top of it.

OK, so now let’s go through the main features of EOS.

There are lots of them, so let’s divide them into 6 categories.

**#1. Processing power**

On day one EOS will be capable of at least 5 thousand transactions per second. Ultimately it’s going to be much more, way over 100 thousand.

-- Let’s take a look how this fits into our landscape. As you can see, it’s gonna be on par with what some of the biggest businesses need.

-- Now, how is EOS going to achieve that?

It’s gonna do it in two dimensions.

* Firstly, via enormous speed of sequential processing. EOS uses a solution borrowed from a currency exchange engine called LMAX, which is capable of millions of transactions per second on a single thread.
* On top of that, we’ll have parallel processing, made possible thanks to clear separation between the things which can be done in parallel, and things which cannot. This is an important distinction, because not everything can be subjected to horizontal scaling.

To give you a better picture of what it means, imagine this. Not so long time ago all our computers had single-core processors, which can only do one thing at a time. This is sequential processing. And this is how all blockchains operate right now.

Nowadays all our computers, and even mobile phones, have multi-core processors, which can do several things at the same time. This is parallel processing. And this is what EOS will be capable of. Right now, no other blockchain can do this, as it requires a very different architecture.

**#2. Built-in governance**

* In the heart of EOS there is a consensus mechanism called DPOS, which stands for Delegated Proof of Stake.

In DPOS block producers are elected by the token holders, each voting according to their stake.

The most important thing in this context is the fact that stakeholders can switch their vote any time they want. Which means the whole thing is powered by reputation. It’s hard to get elected, but very easy to lose the job.

* EOS implements DPOS, but extends it even further. In EOS block producers do much more than just produce blocks. For example, they have the ability to freeze & fix broken apps.
* What else have we got? There is a complete governance structure, including a legally binding constitution, an arbitration system for resolving disputes, and an entire system of shareholders voting.
* Generally, EOS itself acts like a giant, fully autonomous, self-governed decentralized app, whose business is hosting other decentralized apps.

**#3. Infrastructure for apps**

* In EOS developers only need to write code for what’s unique for their application. All common features, including low-level stuff, are provided by the blockchain.
* A sample of those features are listed here.  
  Account recovery might be especially interesting here. It works like this. If you get hacked, and as a result lose control of your account, you can get it back, provided you know the previous password, before it was changed by the hacker. And it gets even better. If no hacker was involved but you just lost your password, you can still regain access to your account using EOS social network feature.
* On top of that, the system has a built-in data storage solution which is maintained by the block producers, as part of their job.

**#4. No transaction fees**

* This is my favorite. Your EOS tokens are never consumed, because in EOS there is no such thing as a transaction fee or gas. If you’re an EOS token holder, you can use the system for free.
* The deal is very simple. If you own 1% of the tokens, you own 1% of the network, including all its bandwidth and all its resources.
* The absence of transaction fees means one thing. You can monetize your app any way you want. Because by default your users can interact with your app without paying anything.

**#5. Upgradeable apps**

* In EOS you publish on the blockchain the source code of your smart-contract, not the compiled machine code, as is the case in similar systems. Does it make any difference? Actually, it does.
* It means is that the source code of your app can be recompiled in the future. This way, you can make your smart-contracts fully upgradable, if you opt to retain permission to do so.

So it’s up to you to decide. If you opt in, you’ll be able to improve your app, and also fix bugs in it. If you opt out, your app becomes fully autonomous.

**#6. Asynchronous communication**

* EOS works like a giant email server, as everything is based on sending and receiving messages. Which means that the entire communication in EOS is asynchronous.
* And it just happens that asynchronous communication is the only way to arrange communication between blockchains. As a result, EOS apps can talk to each other NOT only within the same blockchain, but also across blockchains.

So, if we had multiple EOS blockchains, both public and private, everything could be fully interconnected.

Here are EOS main features again, listed together. As you can see, everything revolves around one purpose. To help you build & run a decentralized business.

* EOS processing power makes your app fast & scalable.
* Built-in governance gives you a safety net in case things go seriously wrong in terms of bugs, or if there are any disputes around your smart-contracts.
* Built-in infrastructure saves you a lot of development work. It also saves you a lot of operating costs, as you can rely on features which are free to use.
* The absence of transaction fees gives you full flexibility about the way you can monetize your app.
* Upgradeability lets you constantly improve your app & fix bugs.
* And finally, asynchronous communication lets your app interaction with other apps on other blockchains.

And now I’d like to tell you a little bit about EOS genesis.

Generally, there are two ways of building a smart-contract platform.

* You can start by creating the whole thing, and then attempt to build some concrete apps on top of it. Most probably you’ll be confronted with tough reality when you try to make those apps actually useful. However, this is the prevailing approach in the crypto-space.
* Or you can start with building a couple of concrete, non-trivial apps, make some mistakes while doing this, learn from those mistakes, and as a next step figure out what’s common between your apps, and only then start building the abstraction layer. This is how EOS was born. The team of developers behind EOS have already built some of the most successful blockchain apps in the crypto-space, and now they have set out to leverage their experience by building a general-purpose platform.

And when I say they’ve built successful apps, what I mean is, how useful those apps are in the eyes of users. Not investors. Actual users.

This is what it looks like. Those two blockchain apps, BitShares & Steem, were created by the same developers who are now behind EOS.

And those two apps are very different. BitShares is a decentralized exchange, whereas Steem is a social media platform.

As you can see, Steem is the most used blockchain app in the entire space. Its users perform over a million transactions per day, and which by the way is far less than 1% of its total capacity.

And this is what their UIs look like. As you can see, those are quite complex apps. They still have their deficiencies, but they work smoothly enough to trick you into thinking that they are just normal web apps.

And one more interesting thing. While it’s evident that BitShares & Steem have valid business cases, in reality none of them could be hosted on any existing smart-contract platform, including Ethereum.

Why is that?

Firstly, because those two little apps alone would eat up all of Ethereum processing power.

The second reason is even more significant. Steem business model requires that all user actions are free of charge, as otherwise nobody would post or upvote anything. All smart-contract platforms which are based on the concept of gas, are unable to offer that, and most probably never will.

EOS strong points.

* EOS has a very efficient team with a proven track-record. The best example is Steem. It was conceived, created and launched in just four months.
* EOS is using Web Assembly for running smart-contracts. Web Assembly is a big deal, it’s an emerging industry standard for web applications, supported by Google, Microsoft, and Apple.
* Regarding EOS financial supporters, we have some big names here. Interestingly, both of those guys were also early investors of Ethereum, and they still are.
* And last but not least, we have a declaration from EOS founders to spend about 1 billion USD on supporting the emerging ecosystem around EOS.

Unsurprisingly, EOS has also got its weak points.

* It might be hard for EOS to catch up with the high number of businesses & developers currently working on Ethereum-based projects.
* Using C++ is right now the only way to create smart-contracts on EOS. This will surely change, as Web Assembly gets upgraded, but unfortunately, at this early stage, this is the only way.
* And the system is not live yet, but it will be in June this year.

And now let’s revisit our list of demands required by decentralized apps. As you can see, EOS is doing a pretty good job here, as it covers pretty much every aspect we can think of.

To wrap it up. I think that what sets EOS aside, is not just the technology, it’s actually the unique way it’s going to operate.

* When you consider EOS features, all this might look like some sort of revolution, but actually it’s an evolution. EOS builds on solutions which have already been battle-tested in real-life blockchain apps.
* We must admit that Ethereum is an excellent playing field for smart-contract prototypes. What EOS does is take the notion of smart-contracts to the next level, and makes the whole thing extremely business oriented.
* Can other systems copy EOS solutions? Not really. EOS is quite different from anything else on a very deep level. To follow EOS path, other platforms would have to backtrack a lot regarding some of the fundamental elements of their technology. So it’s quite unlikely.
* Will EOS replace Ethereum? I don’t think so, at least in the predictable future. But what will probably happen is EOS playing a similar role for Ethereum, as Ethereum is playing for Bitcoin.