Experiences with DApp

On Blockchain as a service

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Senior Engineer
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Agenda Slide

1) What is DApp?
2) Where can we apply DApp/Blockchains?
3) DApp Architecture
4) DApp on private/consortium Blockchain!
5) Key takeaways
What is DApp?
Where can we apply DApp/Blockchains?
Where can we apply DApp/Blockchains?

- If shared database with multiple non-trusting updaters &
- Decentralized trust among participants to update the ledger &
- Backed by value for assets represented on Blockchain
Where it should **not** be used?

- If traditional database meets the need ||
- Single participant updates the ledger  ||
- All updaters trust one another ||
- All participants trust third party.
Industry verticals: Emerging Blockchain Applications

- **Manufacturing**
  - Asset tracking
  - Real-time auction for supplier contracts
  - Supply chain transparency
  - Dynamic commodities pricing

- **Retail**
  - Loyalty tracking
  - Product provenance
  - Logistics management
  - Digital rewards
  - P2P selling
  - Ticket purchases

- **Insurance**
  - Claims management
  - Securitized debt/Property payments
  - Fraud detection
  - Automated underwriting

- **Banking and Capital Markets**
  - Audit compliance
  - Bond issuance
  - Trade finance
  - Loan syndication
  - Post trade settlement
  - Global payments
  - Derivatives trading
  - KYC/AML

- **Government**
  - Licensing and ID
  - Land registry
  - Benefits distribution
  - Aid tracking
  - Military security
  - Voting
  - Copyrights
  - Justice system administration

- **Health**
  - Personalized medicine
  - Records sharing
  - Compliance
  - Pharmaceutical provenance

- **Features**
  - Asset transfer and provenance
  - Cross-organizational workflow
  - Multiparty auditing
DApp Architecture
DApp Architecture

Apps built on a blockchain-based, decentralized platform, mainly on Ethereum

Replaces the database/cache and server code
DApps

100+ apps: https://www.stateofthedapps.com/

**Distense** by John Allen
For-profit code cooperative

**Ether Quest** by Ether Dale
Digital fighting arena with RPG elements

**Rouge** by Naïra d’Arcillières
Demo coupon platform

**AnnSol** by Max Kaye
Cryptographic announcements framework

**Tug Of War** by Etherplay
A fully decentralised 2 player game of Witt

**Choon** by Gareth Emery +3
A music streaming service and digital payments ecosystem

**Bits Digit** by Kumar
Social market economy

**Keep Network** by Keep Network Team
An off-chain container for private data
## Storage DApps

**https://www.stateofthedapps.com/**

<table>
<thead>
<tr>
<th>Platform</th>
<th>Category</th>
<th>Users (24h)</th>
<th>Volume (7d)</th>
<th>Dev activity (30d)</th>
<th>User activity (30d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storj</strong></td>
<td>Storage</td>
<td>61</td>
<td>0 ETH</td>
<td>3,788</td>
<td>-19.83%</td>
</tr>
<tr>
<td>Affordable, private, secure cloud storage</td>
<td></td>
<td>+19.61%</td>
<td>0 USD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>X Cloud</strong></td>
<td>Storage</td>
<td>5</td>
<td>0 ETH</td>
<td>101</td>
<td>-48.21%</td>
</tr>
<tr>
<td>Secure and affordable cloud storage</td>
<td></td>
<td>+400.00%</td>
<td>0 USD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sentinel dVPN</strong></td>
<td>Storage</td>
<td>6</td>
<td>0 ETH</td>
<td>65</td>
<td>+12.07%</td>
</tr>
<tr>
<td>Share and monetize your unused bandwidth and earn Sentinel tokens</td>
<td></td>
<td>-33.33%</td>
<td>0 USD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insights Network</strong></td>
<td>Storage</td>
<td>2</td>
<td>0 ETH</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>The future of data is under your control</td>
<td></td>
<td>-84.62%</td>
<td>0 USD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Numerai</strong></td>
<td>Storage</td>
<td>26</td>
<td>0 ETH</td>
<td>20</td>
<td>-37.50%</td>
</tr>
<tr>
<td>Hedge fund built by a network of data scientist</td>
<td></td>
<td>+188.89%</td>
<td>0 USD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DApp on private/consortium Blockchain!

Enterprise use-cases
DApp Architecture for ‘Blockchain service’ on cloud

- **DApp Browser or CLI**
- **User1**
- **User2**
- **Reverse proxy**
- **DApApp**
  - **Appserver1**
    - **Web3.js/es**
    - **API backend**
    - **RabbitMQ**
    - **Smart Contracts**
      - Deployed as EVM bytecode
  - **Appserver2**
    - **Web3.js/es**
    - **User ID to public key mapping**
- **Ethereum blockchain on AWS/Azure/public**
  - **Ethereum Client1**
    - Block 1
    - Block 2
    - Block 3
    - Block n
  - **Ethereum Client2**
    - Block 1
    - Block 2
    - Block 3
    - Block n
  - **Ethereum ClientN**
    - Block 1
    - Block 2
    - Block 3
    - Block n

**Authentication**

auth0
Performance Results

5x Improvement from switching pow to poa + queues

<table>
<thead>
<tr>
<th>Test</th>
<th>RPS</th>
<th>Avg latency (ms)</th>
<th>Median latency (ms)</th>
<th>Config</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC (pow)</td>
<td>4.1</td>
<td>2623</td>
<td>2200</td>
<td>config1</td>
</tr>
<tr>
<td>BC(poa)+rabbitmq</td>
<td>22</td>
<td>250</td>
<td>264</td>
<td>config2</td>
</tr>
</tbody>
</table>

config1: 5 blockchain nodes, aws t2 large(6cpus total)
config2: 5 blockchain nodes, aws c4 large(16 cpus total)
BC: Ethereum Blockchain

RPS: Requests per second
Blockchain/DLT is a disruptive technology applicable across many verticals.

Public/hosted blockchains weighed down by scalability issues:
- Transactions/second is a real concern: PoS (Proof of Stake) consensus can enable scaling.

Adoption of blockchains will exponentially increase after scalability bottlenecks are erased!

Do not use beyond 5 nodes in a private/hosted blockchain/Ethereum.

Use for applications which need below 30 Requests per second on Ethereum.
Thank You
Smart contract execution

POA (Proof of Authority) as consensus algorithm by miners for scalability and high performance
Smart contract deployment

Smart Contracts are compiled to bytecodes. These bytecodes are deployed as instances of Smart Contracts in the Ethereum Virtual Machine (EVM).