



Beyond DeFi

A paper from integrated**CAPITAL**

Presented by

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About integratedCAPITAL

integratedCAPITAL is a provider of lending systems, fintech services and private credit utilizing funding from Family Offices and Wholesale Capital Groups.

We use technology to create simple, efficient and trustworthy systems for real world financial assets similar to the way DeFi utilizes distributed ledger technology and digital assets. Similarities include:

- Building private, permissioned, group networks on cloud platforms for transparency and self control
- Over Collateralizing assets to protect capital
- Mapping legal contract terms and conditions into smart contracts for group governance from start to finish.



Making smart money more agile



What is DeFi ?

- DeFi is short for decentralized finance
- Blockchain-based form of finance
- Doesn't rely on central financial intermediaries (e.g., brokerages, exchanges, or banks) to offer traditional financial instruments
- Utilizes smart contracts on blockchains to allow people to lend or borrow funds from others, speculate on price movements on a range of assets using derivatives, trade cryptocurrencies and earn interest in savings like accounts
- As of Nov 2021, approximately \$107 billion USD is locked in DeFi contracts according to DeFi Pulse and that is applying a narrow set of criteria



Total Value Locked (USD)

\$104.22B

Maker Dominance

17.84%

DeFi Pulse Index

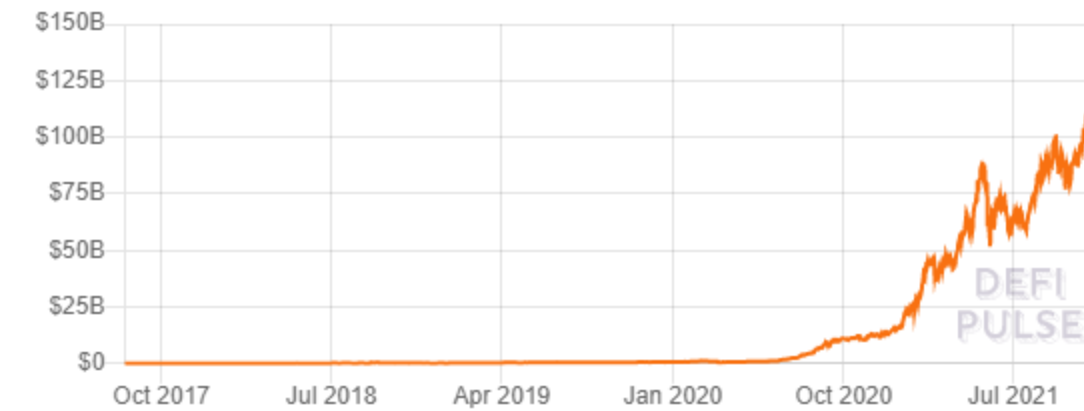
331.83 -16.15
(-4.64%)

Available from [TokenSets](#)

Total Value Locked (USD) in DeFi

[TVL \(USD\)](#) | [ETH](#) | [BTC](#)

[All](#) | [1 Year](#) | [90 Day](#) | [30 Day](#)



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PAYMENTS

ASSETS



DEFI PULSE	Name	Chain	Category	Locked (USD) ▼	1 Day %
1.	Maker	Ethereum	Lending	\$18.59B	7.56%
2.	Curve Finance	Multichain	DEXes	\$15.61B	-7.45%
3.	Aave	Multichain	Lending	\$12.81B	-8.90%



The DeFi Pulse Index is a capitalization-weighted index that tracks the performance of decentralized financial assets across the market.

Token Inclusion Criteria

The DeFi Pulse Index has a collection of criteria composed of four dimensions.

Token's Descriptive Characteristics

- The token must be available on the Ethereum blockchain.
- The token must be associated with a decentralized finance protocol or dapp listed on DeFi Pulse.
- The token must not be considered a security by the corresponding authorities across different jurisdictions.
- The token must be a bearer instrument. None of the following will be included in the index: Wrapped tokens. Tokenized derivatives. Synthetic assets. Tokens that are tied to physical assets. Tokens that represent claims on other tokens.

Token's Supply Characteristics

- It must be possible to reasonably predict the token's supply over the next five years.
- At least 5% of the five-year supply must be currently circulating.
- The token's economics must not have locking, minting or other patterns that would significantly disadvantage passive holders.

Project's Traction Characteristics

- The project must be widely considered to be building a useful protocol or product. Projects focused on competitive trading/holding, having Ponzi characteristics, or projects that exist primarily for entertainment, will not be included.
- The project's protocol must have significant usage.
- The protocol or product must have been launched at least 180 days before being able to qualify to be included in the index.
- The protocol or project must not be insolvent.

Protocol's User Safety Characteristics

- Security professionals must have reviewed the protocol to determine that security best practices have been followed to maintain user assets safe under different circumstances. Alternatively, the protocol must have been operating long enough to create a consensus about its safety in the decentralized finance community.
- In the event of a safety incident, the team must have responded promptly and addressed the incident responsibly in the aftermath, providing users of the protocol with a reliable solution and the decentralized finance community with adequate documentation to provide transparency about the incident.
- The selected tokens must have sufficient liquidity across a variety of trading platforms.



Examples

- Maker (MKR) is the governance token of the MakerDAO and Maker Protocol – respectively a decentralized organization and a software platform, both based on the Ethereum blockchain – that allows users to issue and manage the DAI stablecoin.
- Curve is a decentralized exchange for stablecoins that uses an automated market maker (AMM) to manage liquidity
- Aave is a decentralized finance protocol that allows people to lend and borrow cryptocurrencies



What is not included ?

- The token must be a bearer instrument. The token must not be considered a security by the corresponding authorities across different jurisdictions.
- The token's economics must not have locking, minting or other patterns that would significantly disadvantage passive holders.
- Projects focused on competitive trading/holding, having Ponzi characteristics, or projects that exist primarily for entertainment, will not be included.
- Excludes Wrapped tokens. Tokenized derivatives. Synthetic assets. Tokens that are tied to physical assets. Tokens that represent claims on other tokens.



Why are regulators concerned ?

- Regulators and Central Banks see their roles as needing to control monetary policy and supply within their respective jurisdictions and to protect their constituents from unscrupulous and predatory operators
- We have seen the crackdown in China making way for their own CBDC and the USA seeking to regulate operators and exchanges
- In my view, this will increase so we need to get used to it. In particular, their focus will be on
- Tokens that have the characteristics of a security by the corresponding authorities
- Projects focused on unlicensed trading/holding, tokenized derivatives or having Ponzi characteristics



DeFi + Real World Assets =Real World DeFi

- Current developments are still a playground for the crypto savvy and / or crypto rich
- Institutions are still only experimenting and observing with some adoption amongst themselves
- Mass adoption will come when tokenised Real World Assets such as land, buildings and securities are available in combination with sanctioned digital currencies for use on decentralised finance platforms.



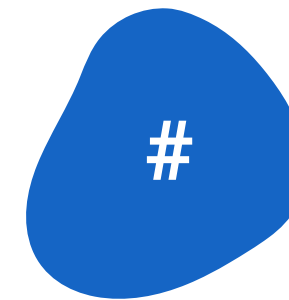
divisia E2EFi Platform Statistics



Transactions Funded
\$156,743,964



Asset Value Created
\$248,469,575



Number of Assets Created
663



Current Transactions
\$26,343,280



What is divisia

- 'divisia' is a word we use for the state reached by the smallest number of participants necessary to embed internal control into a financial transaction via division of duties
- Division of duties is the concept of having more than one person required to complete a task so as to prevent fraud and error and to build trust
- Our software platform maps and encodes the division of duties inherent within traditional financial transactions into a set of processes to be completed end to end (E2E) to achieve 'divisia'



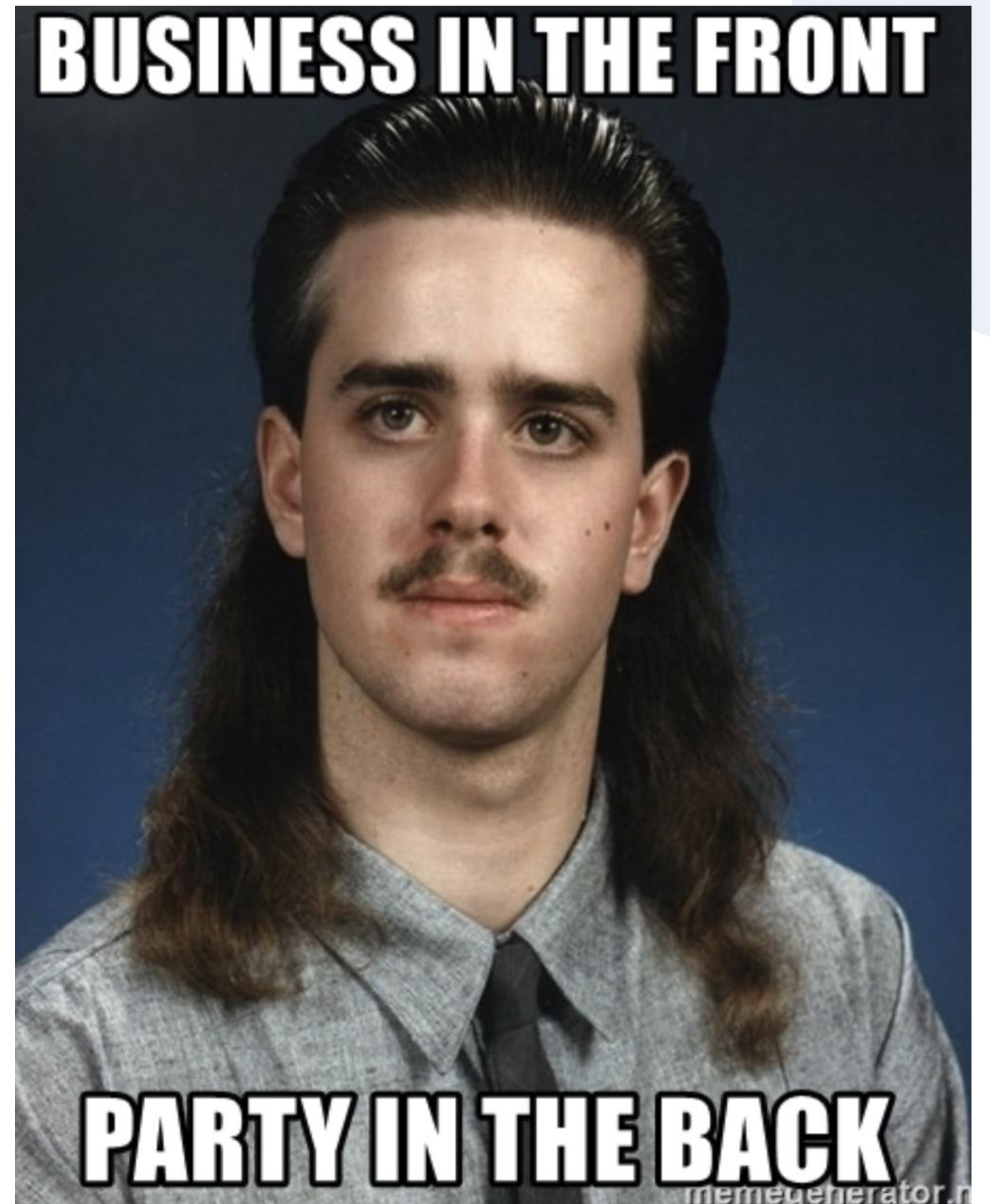
Deeper dive into E2EFi





Talking Technical

- DLT technology
- Architecture
- Enterprise Security
- Deployment
- Operations
- Challenges





Distributed Ledger Technology

Consensys Quorum technology stack

- Hyperledger Besu provides, blockchain immutable ledger, smart contracts, multi tenancy and distributed consensus protocol (IBFT 2.0), Ethereum JSON-RPC enterprise standard amongst numerous other things.
- Orion is a privacy manager that encrypts and shares private states within privacy groups. A privacy group is a set of Orion instances participating in a set of private transactions.



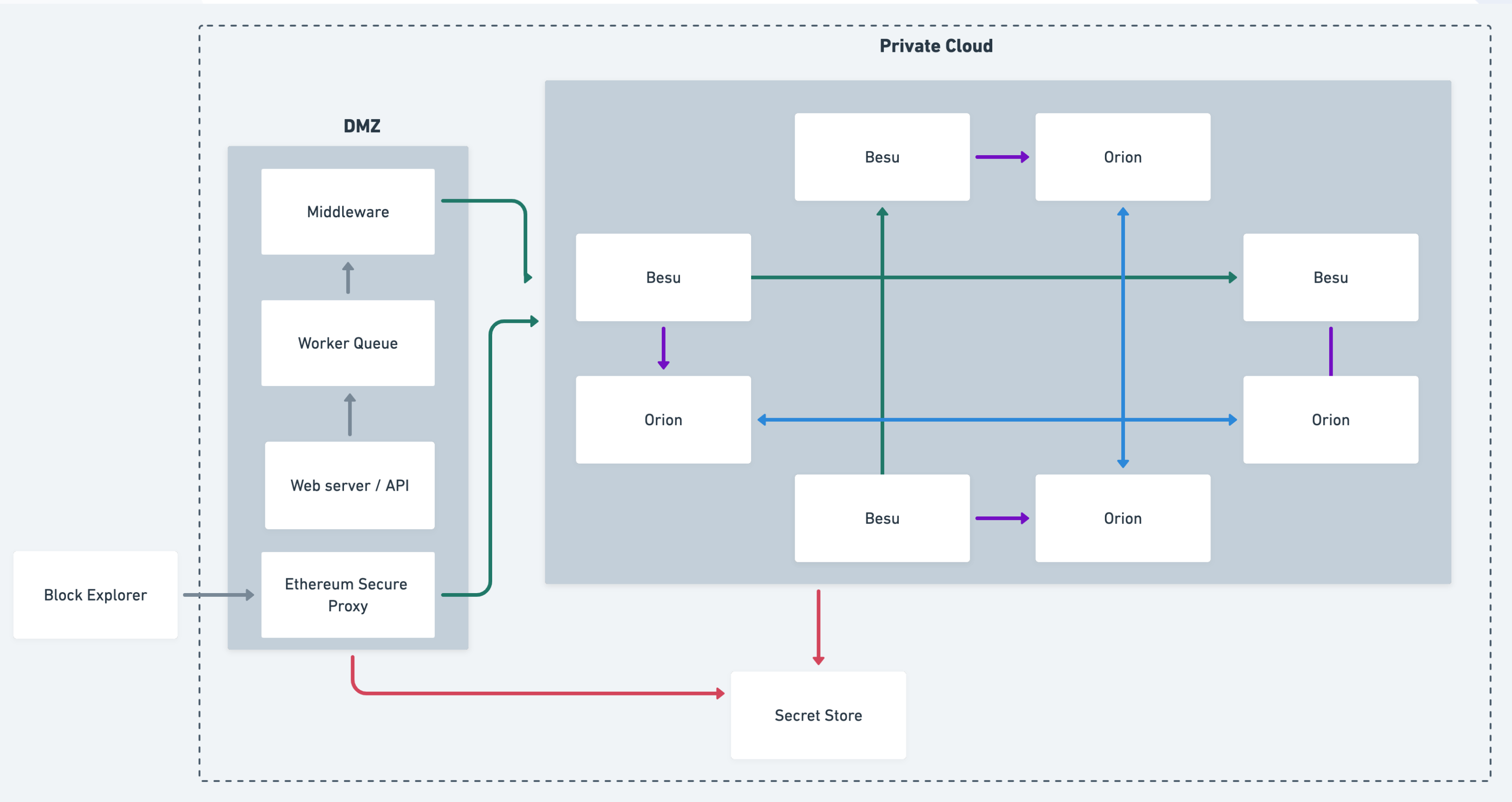
What is a Consortium Chain ?

Chain Type	Public	Private	Consortium
Permissionless	Yes	No	No
Who Can Read	Anyone	Invited Users Only	Depends
Who Can Write	Anyone	Approved Participants	Approved Participants
Ownership	Nobody	Single Entity	Multiple Entities
Participants Known	No	Yes	Yes
Transaction Speed	Slow	Fast	Fast



Application Architecture

Application		
Dapps	API / Web app	Explorer
Smart Contract Tools	Solidity	
Tooling		
Credential Management	Hashicorp Vault	
Smart Contract Tools	JSON-RPC	
Integration and Development Tools	Web3js, Go (lang), web3js-eea, typescript, docker, consul template	
Enterprise 3 P's		
Privacy	Off-Chain / Trusted Compute	Private Transactions
Performance	Managed Finality (IBFT 2.0)	
Permissioning	Client Whitelist and / or Known CA	
Core Blockchain		
Storage / Ledger	Off-Chain Storage	Private Transactions
Execution	EVM	Precompiled Contracts
Consensus	Proof of Authority (IBFT 2.0)	
Network		
Network Protocol	Devp2p (Ethereum)	Orion REST API





Middleware Service

- Loans are represented as smart contracts and include details such as the parties involved, the size of the loan, etc.
- Loans and transactions on our platform are deployed to our consortium blockchain via a middleware service.
- Provides a layer of abstraction by keeping the platform decoupled from the blockchain.

Date	Details	Debit	Credit	Balance	Action
30-04-2021	Interest from 01-04-21 to 30-04-21	0.07		100.07	
07-04-2021	Demo Transaction.	100.00		100.00	

POST blockchain-api/transaction

```
{  
  "epoch": 1619496806,  
  "description": "Demo Transaction.",  
  "debit": 100,  
  "credit": 0  
}
```



Enterprise Security

Secret Vault

- Client and server certificates are rotated automatically in production every 30 days.
- TLS Certificates generated abide by certificate policies
- Secret access logged
- Cipher store

Mutual TLS

- Server and Client authentication
- Zero trust security framework with public key encryption
- Mutual authentication or two-way authentication which identifies the client as well as the server using x.509 certificates provided by the secret vault
- All communications between and within the network are encrypted via TLS 1.3



Security Practices and Procedures

Operating in the Decentralised World

- Sometimes there's **no second chances**
- Need to define **procedures** and **best practices**
 - Ensure processes can be **understood** and **replicated** by others
 - **Secure Storage** of sensitive information
- Perform rigorous **testing**
 - **Testing networks** are your best friend



HASH `0x2d9e ... bd6c0b` **VALUE** 0.00 ETH ✓

BLOCK `#1363` **TIME** 2 minutes ago **13 confirmations**

POSITION 0 **NONCE** 0

FROM `0xB1Ca ... 2E8e20` **TO** `0x0000 ... 00007E`

GAS LIMIT 3,000,000 **GAS PRICE** 0 Gwei

GAS USED BY TX 21,512 **0.72%** **TX FEE** 0.00 ETH

CUMULATIVE GAS USED 21,512

INPUT DATA
0x 83 6f 4d 41 d2 0f bf 34 e8 fe c5 56 f5 c9 bc
e8 2f 4d f3 c9 cf 33 89 b6 55 fe 29 65 47 a6 0c
8f

Ethereum Lite Explorer
An open source Ethereum block explorer. Available on

Q Search...

LAST BLOCKS TRANSACTIONS

#1363 1 TXs

LATEST BLOCK `#1363` TIME 3 seconds ago TRANSACTIONS 1 UNCLES 0

Block Explorer

- Proxy service exposes a subset of the JSON-RPC functionality needed to visualise the blockchain.



Deployment

- CI / CD with Gitlab CI
- Docker images are built, tested and deployed in a controlled environment.
Production access is limited.
- Provisioning of all services is automatic
- Docker containers are immutable
- PKI and provisioning configs are stored in Hashicorp Vault including Gensis file, Besu PKI keypairs, Orion PKI pairs
- 'Consul Template' for templating required configurations and ciphers including PKCS12 keystore, client and enclave certificate fingerprint whitelist. Keystores and whitelists are generated when certs are rotated else authentication will fail



Operations

- Running for 7 months, block generation period of 5 seconds, 24GB of space consumed
- Hard to troubleshoot TLS authentication issues through multiple parties
- Error handling is quite complicated with web3js, web3js-eea and pattern matching error strings had to be used to enrich errors being returned.
- 'Hashicorp Vault' can be a source of DOS if you watch for too many keys and you don't cleanup after yourself.

<https://www.hashicorp.com/blog/vault-resource-quotas>



Challenges

- Development can be slow when running 5 Besu and Orion nodes on your local dev machine. Try to use a cut down environment if you can.
- Hard to find good examples of consortium chain usages running on Hyperledger Besu / Orion.
- Developing with Java, Nodejs and typescript is heavy and slow compared to Go(lang)
- Besu and Orion cryptographic primitives can be non standard and non interoperable
- Mutual TLS is hard when dealing with three different languages and different cryptographic primitives



What's next for us?

- Licensing System using Points & Rewards
- Decentralized contract administration
- Additional financial transaction types for example Design and Construction Contracts, Bond-holder Agreements, Environmentally-friendly and Ethical (ESG) Contracts



Q+A

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*Email your resumes to Richard McKeon at
richard@integratedcapital.io*



integrated**CAPITAL**

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BIOGRAPHY RICHARD MCKEON

Richard McKeon is the principal of integratedCAPITAL, a group of fintech companies which has developed and licences the divisia E2EFi™ Platform as a Service for Family Offices, Wholesale Capital Owners and Financial Services firms.

Development of the platform to date includes converting legally binding paper contracts governing financial transactions into digital processes, establishing distributed ledger networks to run, control and record financial transactions for real world assets on private and public infrastructure and development of a utility token points and rewards system for licensing and incentivizing desirable behavioural economics.

Richard is a Chartered Accountant by profession and holds a practicing certificate from the Institute of Chartered Accountants in Australia. He has extensive experience in taxation, business services, business planning, IT services, project funding and peer to peer lending. He is a trusted Family Office adviser.



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