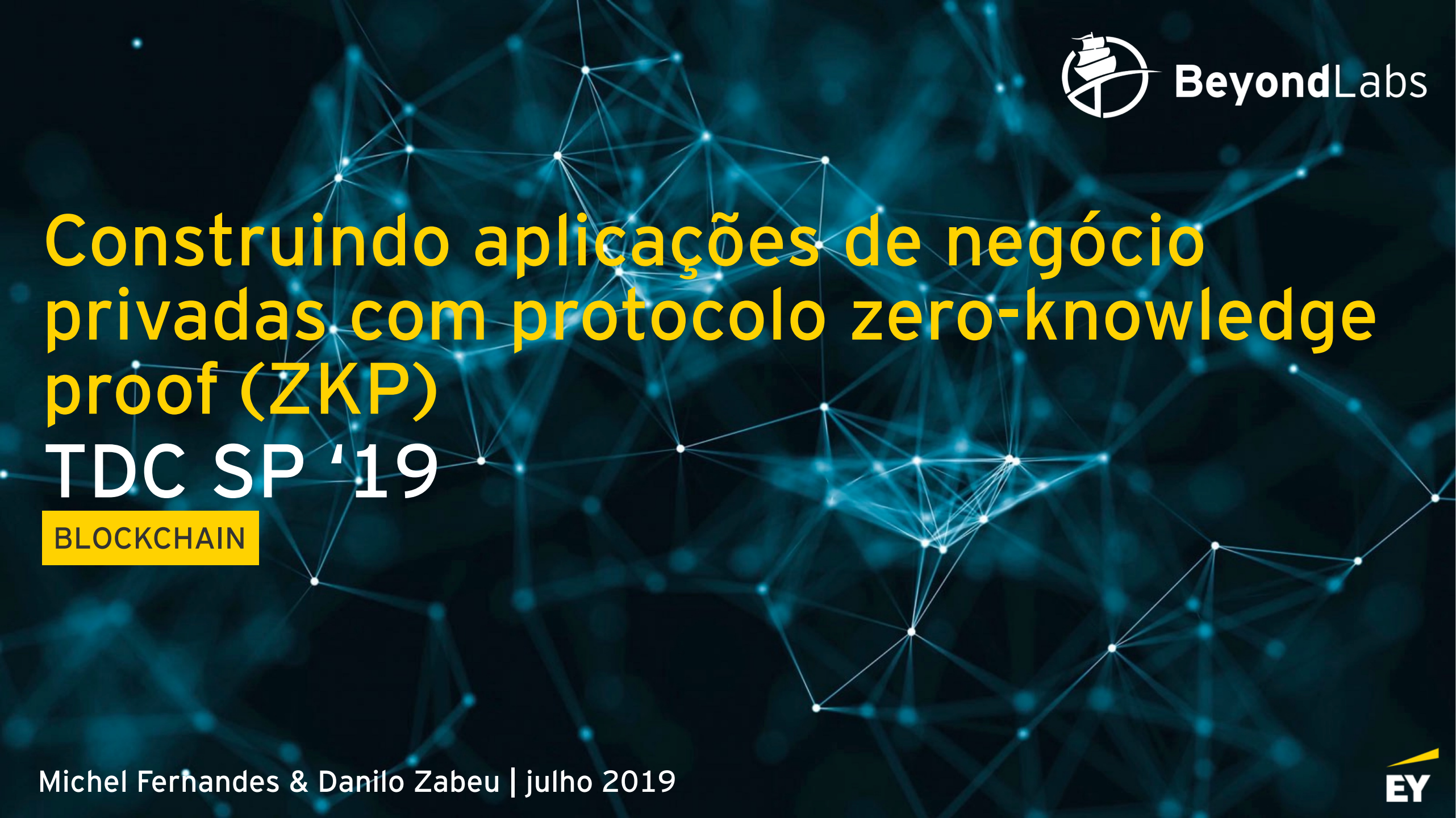
BeyondLabs
Construindo aplicações de negócio privadas com protocolo zero-knowledge proof (ZKP)
TDC SP '19
BLOCKCHAIN
Michel Fernandes & Danilo Zabeu | julho 2019
EY

DANILO ZABEU

BLOCKCHAIN LEAD

MICHEL FERNANDES

CHIEF ENGINEER


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Building a better working world
#bewavespace
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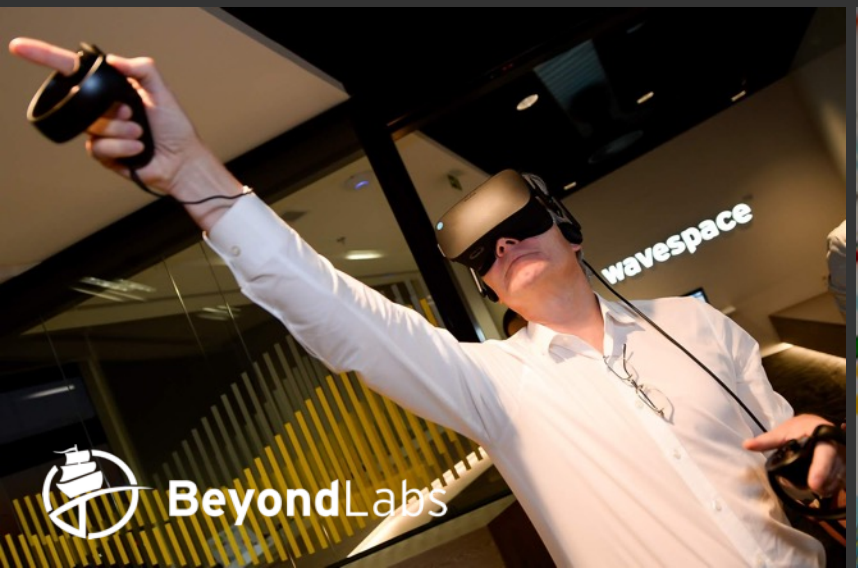
wavespace
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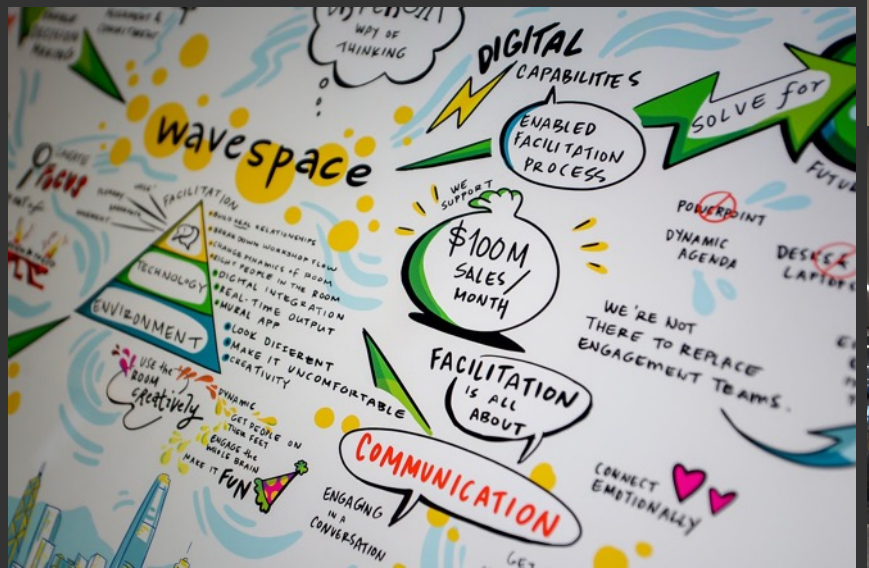
wavespace
DIGITAL CAPABILITIES
ENABLED FACILITATION PROCESS
SOLVE FOT
$100M SALES/MONTH
POWERPOINT
DYNAMIC AGENDA
WE'RE NOT THERE TO REPLACE ENGAGEMENT TEAMS.
FACILITATION IS ALL ABOUT
COMMUNICATION
CONNECT EMOTIONALLY
ENGAGING IN A CONVERSATION
TECHNOLOGY
ENVIRONMENT
MAKE IT FUN


space™
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ECOSISTEMA

CRYPTOECONOMICS

BUSINESS APPLICATIONS
aka SMART CONTRACTS

ETHEREUM | QUORUM | HYPERLEDGER FABRIC | CORDA

PUBLIC | PERMISSIONED

DISTRIBUTED LEDGER TECHNOLOGY BACKED BY BLOCKCHAIN

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SMART CONTRACT

- STANDARDIZED TOKENS
- RULES
- DESIGN PATTERNS
- AUDIT & SECURITY
- PUBLICITY

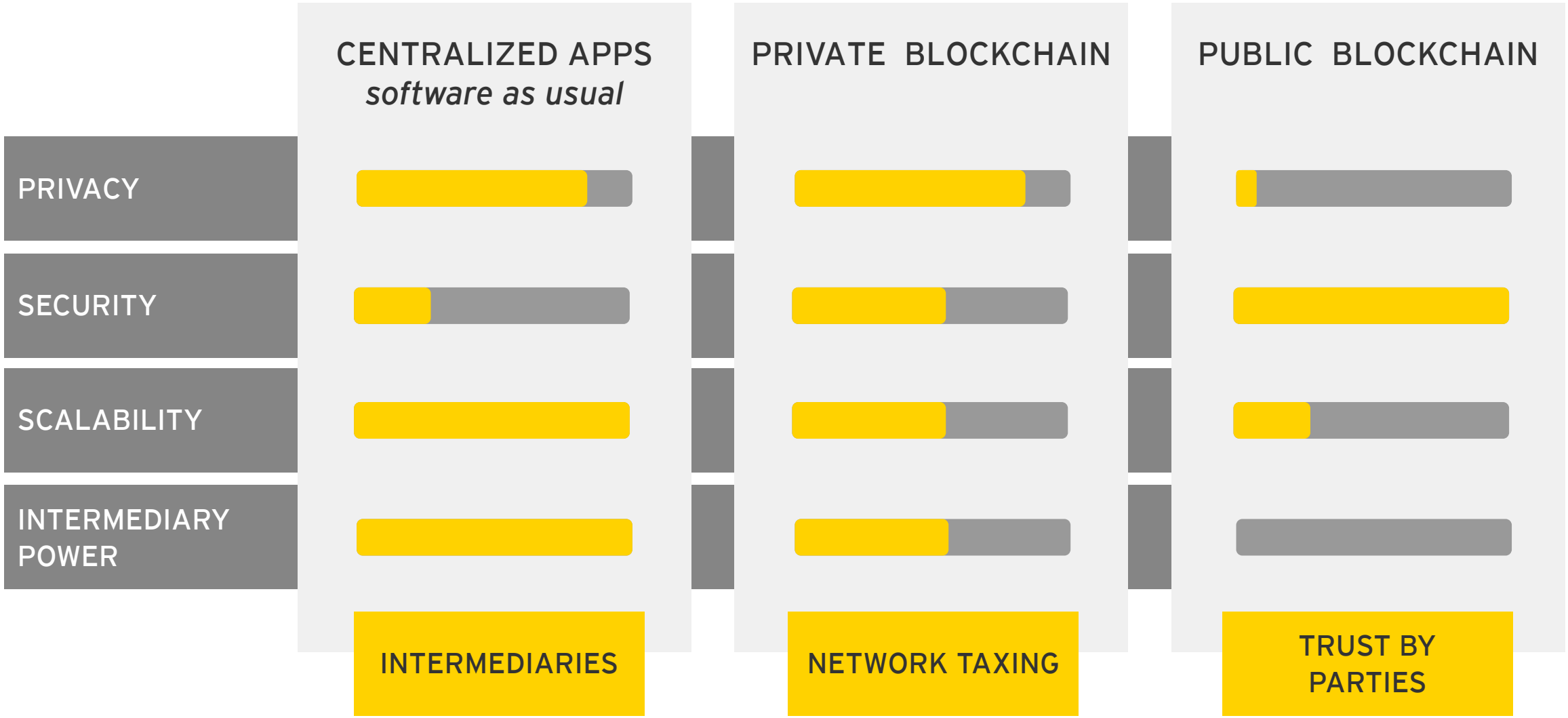
MUST FOLLOW PRINCIPLES AND PATTERNS IN THE SAME WAY OF APPLICATION DEVELOPMENT

USING STANDARDIZED TOKENS ENABLES INTEROPERABILITY AND PORTABILITY BETWEEN PARTICIPANTS

PUBLIC = UNIVERSAL APPS
PRIVATE = SPECIALIZED APPS

CHOOSE A PLATFORM THAT WILL ENABLE FRICTIONLESS MIGRATION FROM PRIVATE TO PUBLIC

PLATAFORMAS PÚBLICAS E PRIVADAS



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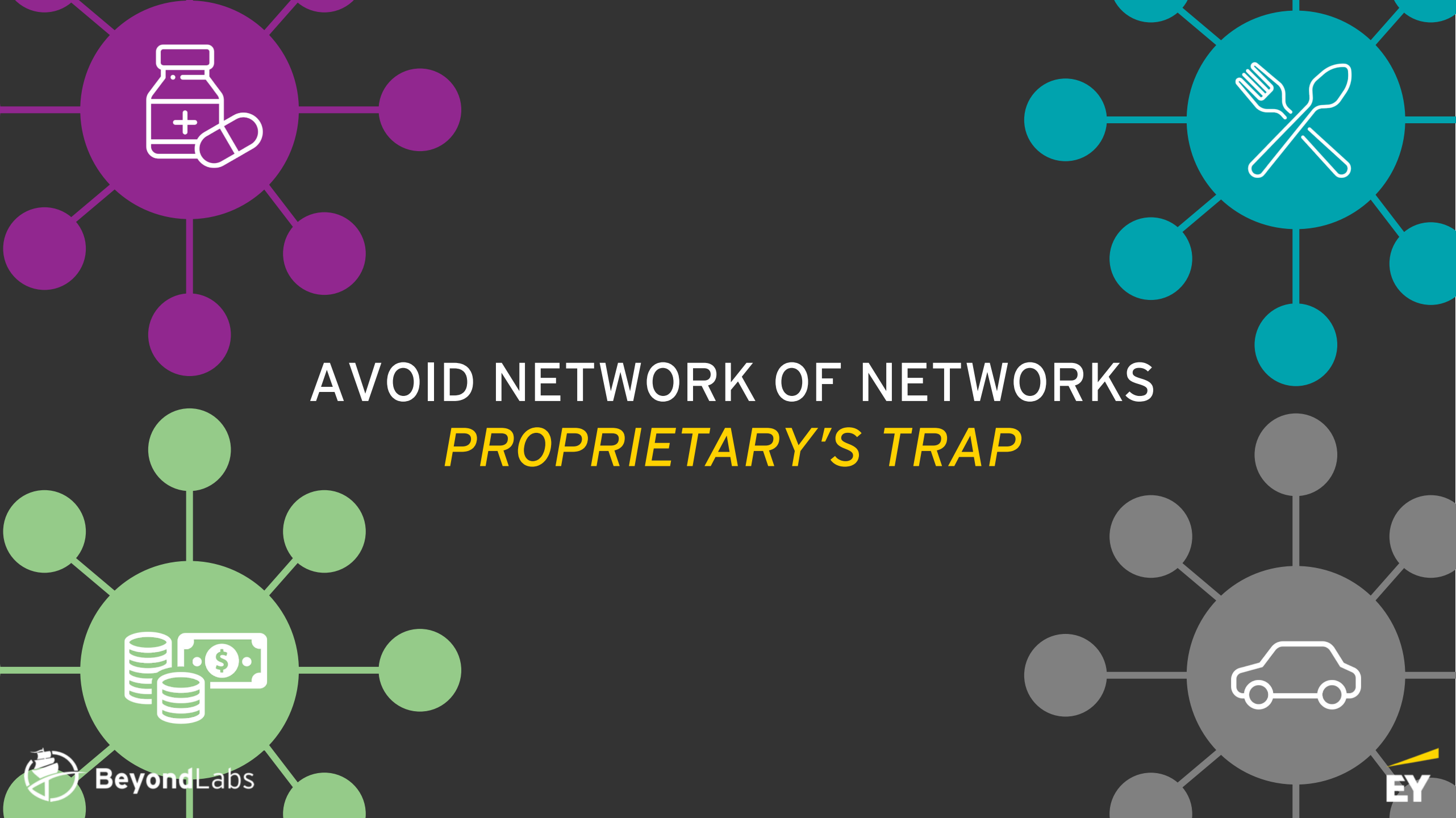
AVOID NETWORK OF NETWORKS
PROPRIETARY'S TRAP
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BUSINESS INTEGRATION

CONTRACT

Paper contracts

ORDER

Purchase order sent by email through ordering app against contracts

FULFILL

Shipment and email sent through tracking logistics app

INVOICE

Invoice sent by email through the seller's ERP app

PAY

Bank transfer after 60 days sent by the buyer through the buyer's ERP app

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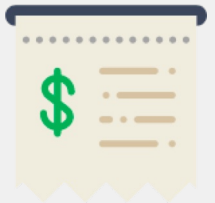
BUSINESS INTEGRATION

CONTRACT	ORDER	FULFILL	INVOICE	PAY
				
Paper contracts	Purchase order sent by email through ordering app against contracts	Shipment and email sent through tracking logistics app	Invoice sent by email through the seller's ERP app	Bank transfer after 60 days sent by the buyer through the buyer's ERP app
SMART CONTRACTS	SIGNAL	NON-FUNGIBLES TOKENS	SIGNAL	FUNGIBLE TOKENS

ONE PUBLIC BLOCKCHAIN PLATFORM: **ETHEREUM**

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ONE TO RULE THEM ALL

"One day you get a call from a very large buyer saying, 'Would you like to join my private blockchain?' You say, 'Okay.' And then you get the same call from your wholesaler, your suppliers, your shipper, your insurance company and maybe even your bank...or several of each of these! Suddenly you are spending all your time – and a lot of money – juggling dozens of blockchains. When the next partner calls, you say, 'Just fax me the order.' "

Paul Brody

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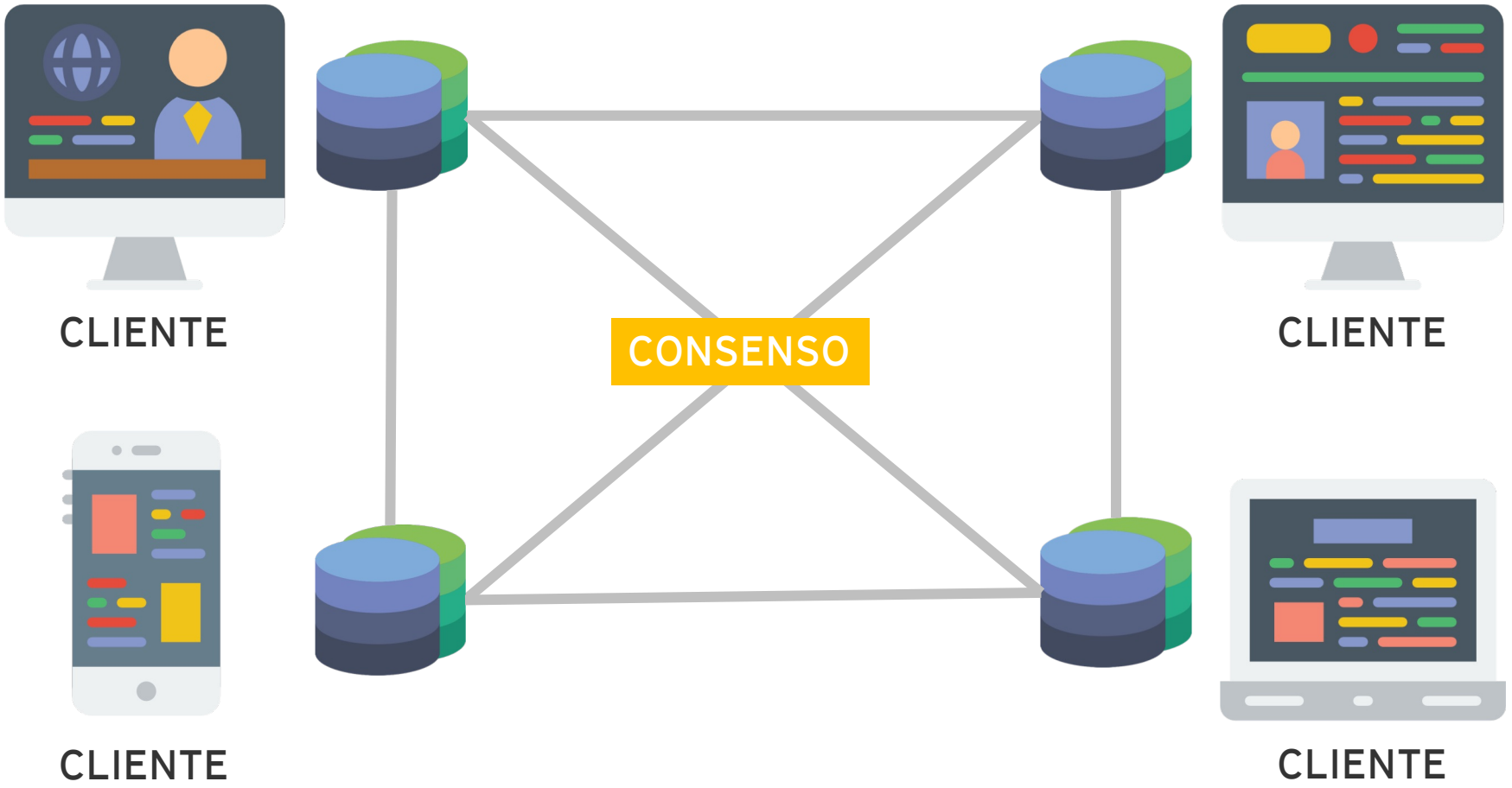
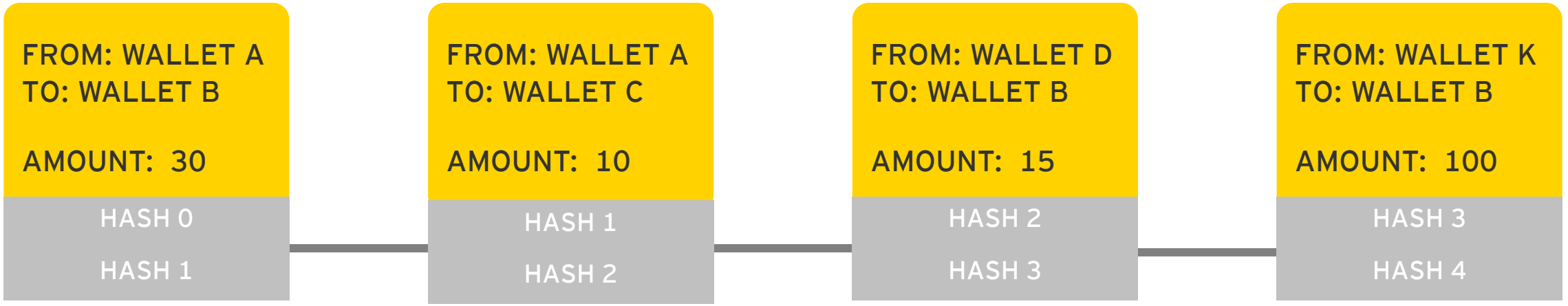
BLOCKCHAIN ATUAL PÚBLICO



CUSTO DO DESIGN



Token BNB

Binance | Exchange

Buy | Earn Interest | Crypto Credit

Overview [ERC-20]

PRICE
$33.9027 @ 0.116999 Eth (-5.84%)

FULLY DILUTED MARKET CAP
$562,089,763.32

Total Supply: 16,579,517.055253... BNB

Holders: 317,739 addresses

Profile Summary

Contract: 0xB8c77482e45F1F44dE1745F52C74426C631bDD52

Decimals: 18

Official Site: https://www.binance.com/

Social Profiles:

Announcement: Binance Chain Mainnet Swap

FILTERED BY TOKEN HOLDER
0xe1743b9f9b65e41b51970befdf5a60f3161f536a

BALANCE
369.5018675 BNB

VALUE
$12,527.10 (~43.2312 Eth) [0.0022%]

Transfers | Info | Exchange | Read Contract | Write Contract | Analytics

0xe1743b9f9b65e41b5197...

A total of 6 transactions found

First | < | Page 1 of 1 | > | Last

Txn Hash	Age	From		To	Quantity
0xe5b394f1eeb4bd...	17 mins ago	0xe1743b9f9b65e4...	OUT	0x74bee08fd2ce34a...	50

PRIVACIDADE

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ZKP

ZERO KNOWLEDGE PROOF

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A CAVERNA DO ALI BABA

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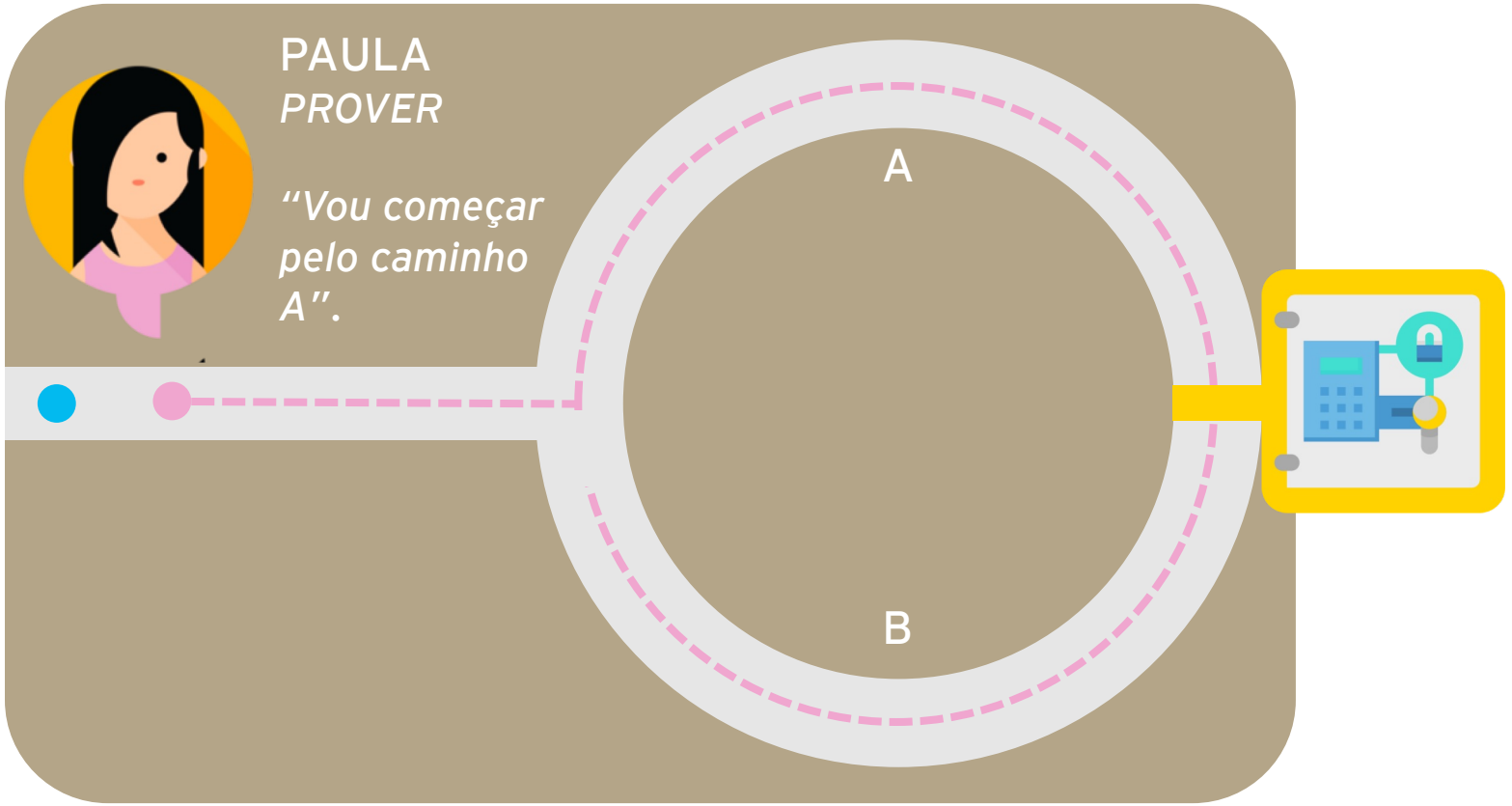
PROVA DE ZERO CONHECIMENTO

VICTOR
VERIFIER

"Se você tem o código, vá pelo caminho A."



PORTA
CODIFICADA
KNOWLEDGE

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COMPLETUDE
COMPLETENESS

UM PROVADOR HONESTO SEMPRE SERÁ CAPAZ DE CONVENCER UM VERIFICADOR

SOLIDEZ
SOUNDNESS

UM PROVADOR MALICIOSO NÃO DEVERÁ SER CAPAZ DE CONVENCER UM VERIFICADOR

ZERO CONHECIMENTO
ZERO-KNOWLEDGE

NÃO SERÁ REVELADO NENHUMA INFORMAÇÃO

PROVA DE ZERO CONHECIMENTO

"Eu sei **x**, tanto que **y = F(x)**".

PROVER

- **F** *function*
- **y** *claimed output*
- **x** *private input*

VERIFIER

- **F** *function*
- **y** *claimed output*

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zk-SNARKS

ZERO-KNOWLEDGE SUCCINCT NON-INTERACTIVE ARGUMENT OF KNOWLEDGE PROOFS

ARGUMENTO
ARGUMENT

SOLIDEZ ALCANÇADA POR UM VERIFICADOR POLINOMIAL ASSOCIADO

NÃO INTERATIVO
NON-INTERACTIVE

SEM INTERAÇÃO ENTRE O PROVADOR E O VERIFICADOR

SUSCINTO
SUSCINT

VERIFICAÇÃO RÁPIDA, NÃO DEPENDE DO TEMPO DE EXECUÇÃO DA FUNÇÃO

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FUNCIONAMENTO DO ZK-SNARKS

SETUP DOS PARES DE CHAVES PRIVATE/PUBLIC PARA GERAR CHAVES DE PROVA E VERIFICAÇÃO SEQUÊNCIA NUMÉRICA LAMBDA

COM A CHAVE DE PROVA, ENTRADA PÚBLICA (*ENDEREÇO DO ETHEREUM*) E A *PRIVATE WITNESS* (INFORMAÇÃO) É GERADO UMA **PROVA**

VERIFICAÇÃO REALIZADA A PARTIR DA CHAVE DE VERIFICAÇÃO, ENTRADA PÚBLICA E PROVA, SENDO UMA FUNÇÃO BOOLEANA PARA O RESULTADO.


TRUSTED SETUP
TOXIC WASTE
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TAU CERIMONY

ZCASH

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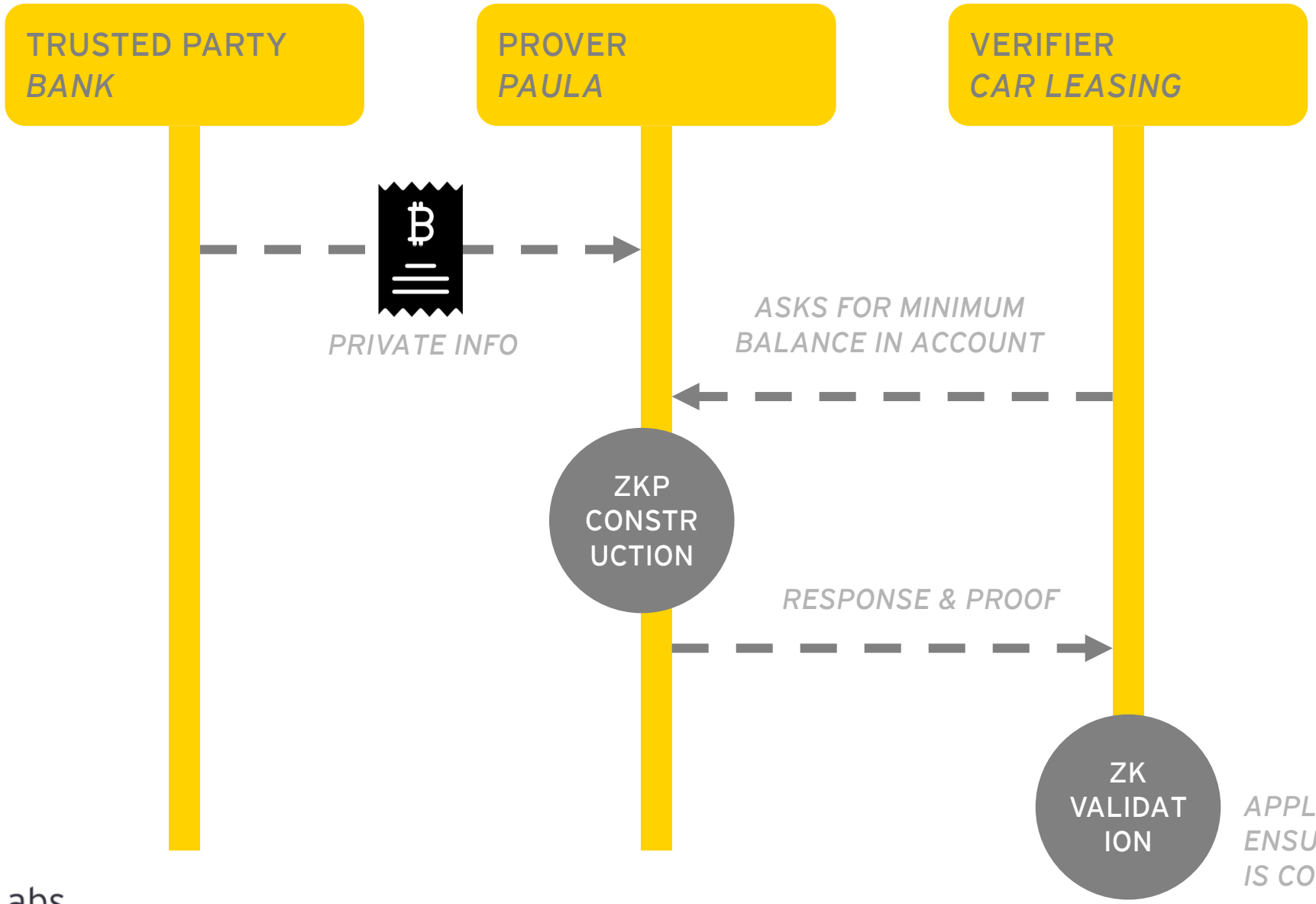
SIMPLE DATA EXCHANGE EXAMPLE



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APLICAÇÕES

VALIDAÇÃO DE ID

AUTENTICAÇÃO

VOTAÇÃO

MENSAGENS

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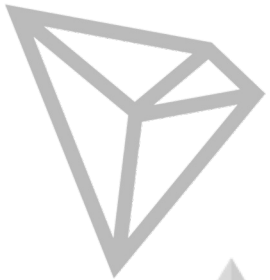
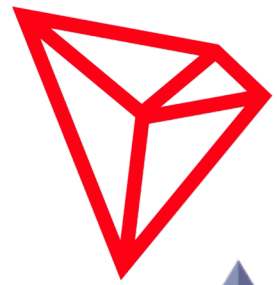
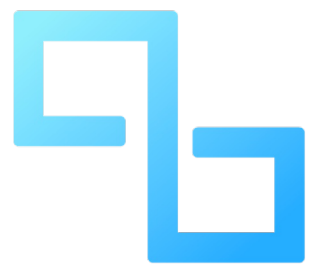
EMPRESAS E PLATAFORMAS QUE USAM ZKP



EMPRESAS E PLATAFORMAS QUE USAM ZKP





NIGHTFALL

WELCOME

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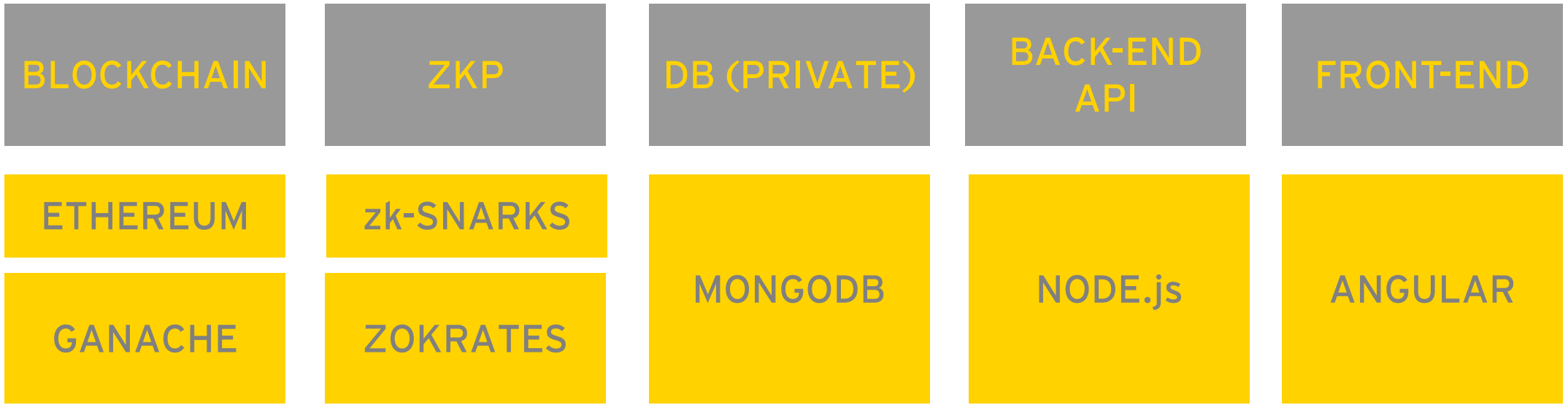
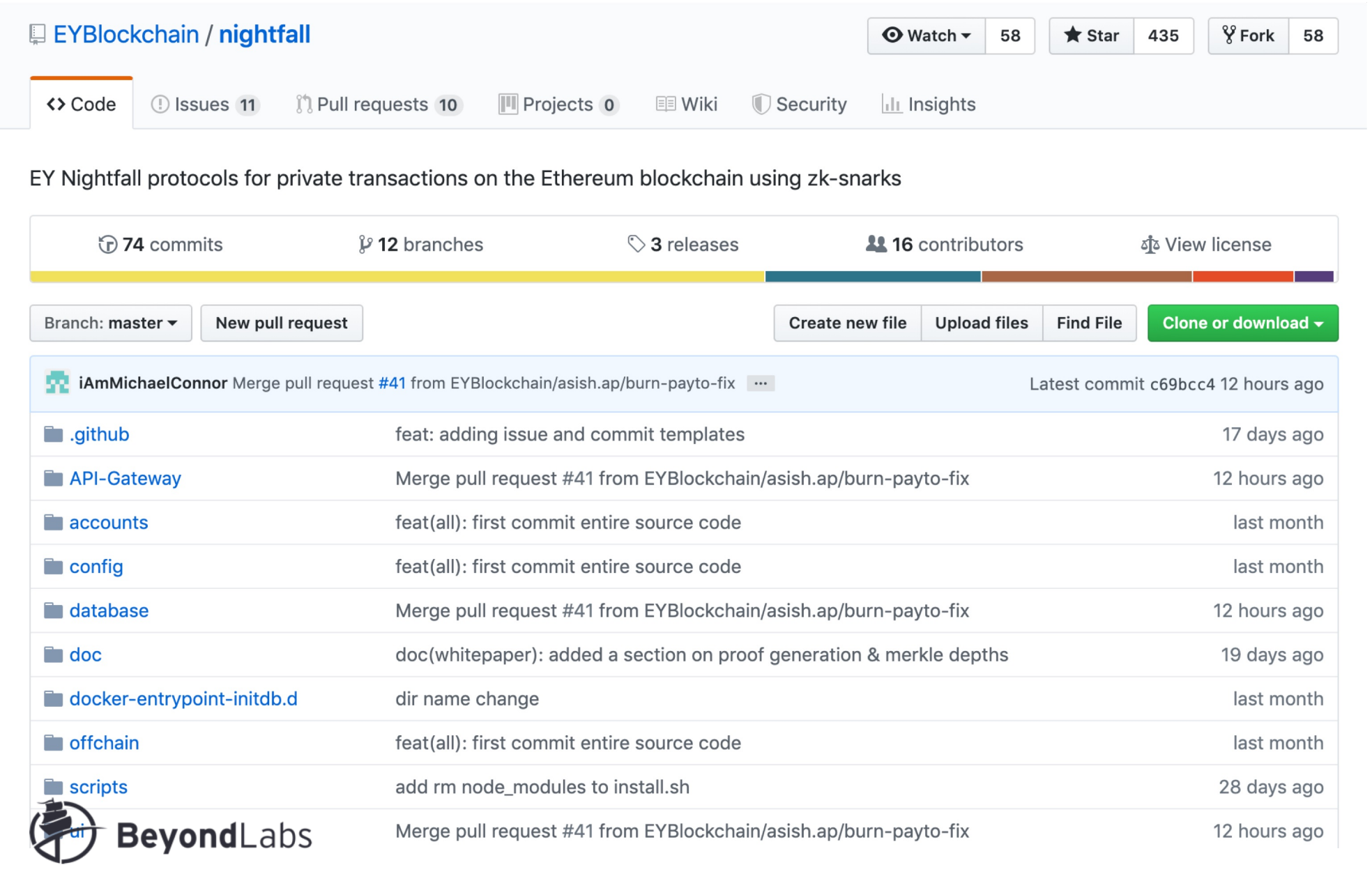
NIGHTFALL'S STACK



https://github.com/EYBlockchain/nightfall



PUBLIC DOMAIN

OPEN SOURCE

ACCEPTING PULL REQUESTS ☺

ALPHA

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ZKP Demo

michel | Sign Out

Account Balance

0	1	50	50
ERC-721: EYToken (EYT)	EYToken Commitments	ERC-20: EY OpsCoin (OPS)	EY OpsCoin Commitments

Actions

MINT EYTOKEN	MINT EYTOKEN COMMITMENT	MINT EY OPSCOIN	MINT EY OPSCOIN COMMITMENT
TRANSFER EYTOKEN	TRANSFER EYTOKEN COMMITMENT	TRANSFER EY OPSCOIN	TRANSFER EY OPSCOIN COMMITMENT
BURN EYTOKEN	BURN EYTOKEN COMMITMENT	BURN EY OPSCOIN	BURN EY OPSCOIN COMMITMENT

Transactions History

EYToken | EYToken Commitment | EY OpsCoin | **EY OpsCoin Commitment**

Type	Coin Value	Coin Commitment	Coin 1 Value	Coin 1 Commitment	Coin 2 Value	Coin 2 Commitment	Date	Send To
MINTED	OPS 50	0xba588fb7ad70b7775f...					13/07/2019 02:08:37 PM	

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EY

ZKP Demo

zabeu Sign Out

Account Balance

0	1	0	1
ERC-721: EYToken (EYT)	EYToken Commitments	ERC-20: EY OpsCoin (OPS)	EY OpsCoin Commitments

Actions

MINT EYTOKEN	MINT EYTOKEN COMMITMENT	MINT EY OPSCOIN	MINT EY OPSCOIN COMMITMENT
TRANSFER EYTOKEN	TRANSFER EYTOKEN COMMITMENT	TRANSFER EY OPSCOIN	TRANSFER EY OPSCOIN COMMITMENT
BURN EYTOKEN	BURN EYTOKEN COMMITMENT	BURN EY OPSCOIN	BURN EY OPSCOIN COMMITMENT

Transactions History

EYToken | EYToken Commitment | EY OpsCoin | **EY OpsCoin Commitment**

Type	Coin Value	Coin Commitment	Coin 1 Value	Coin 1 Commitment	Coin 2 Value	Coin 2 Commitment	Date	Send To
RECEIVED	OPS 1	0x6dbd0d3681c8ee4409...					13/07/2019 02:32:44 PM	

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