Tyra White Paper
Open Source to Open Resource

Introduction

Tyra Network is a global backend infrastructure that transforms millions of open source projects into live services (a.k.a. Open Resource).
This document outlines our plans for a real-time, event-driven blockchain platform that aims to initiate innovation in the decentralized application economy, particularly for AI Programs

Problem Statement

The advent of the Open Source movement provided an opportunity for anyone to freely access, distribute, and modify the software. Since the GNU Project by Richard Stallman in 1983, it has become possible to run computers using only free, Open Source software. Today, even giant technology companies have begun open sourcing their code to enable developers to contribute to their

services. Despite this progress, a growing number of Open Source projects are not instantly executable in a regular developer's environment. This is because the source code is developed on different types of computers in different runtime environments (i.e., IoT), and programs require vast amounts of resources or specialized hardware such as GPUs or TPUs (i.e., Machine Learning). Back in 1983, Stallman envisaged that anyone should be able to augment programs that were initially written by other developers. If a small number of developers can run a program, this will prevent other developers from offering contributions to the Open Source project and impede progress of the project.

Open Resource Initiative

We propose "Open Resource" as the next evolutionary milestone of Stallman's initial Open Source initiative. Open Resource starts by decoupling the role of developers from the role of resource providers. Developers should be able to upload their programs on the open network freely, and resource providers should only be concerned with operating the program and sharing the revenue in return. By decoupling these two responsibilities, liability and cost of resource management will no longer belong to developers. The Tyra Network blockchain will serve as a bridge between the program and the resource, offering a stable way to utilize Open Source solutions.
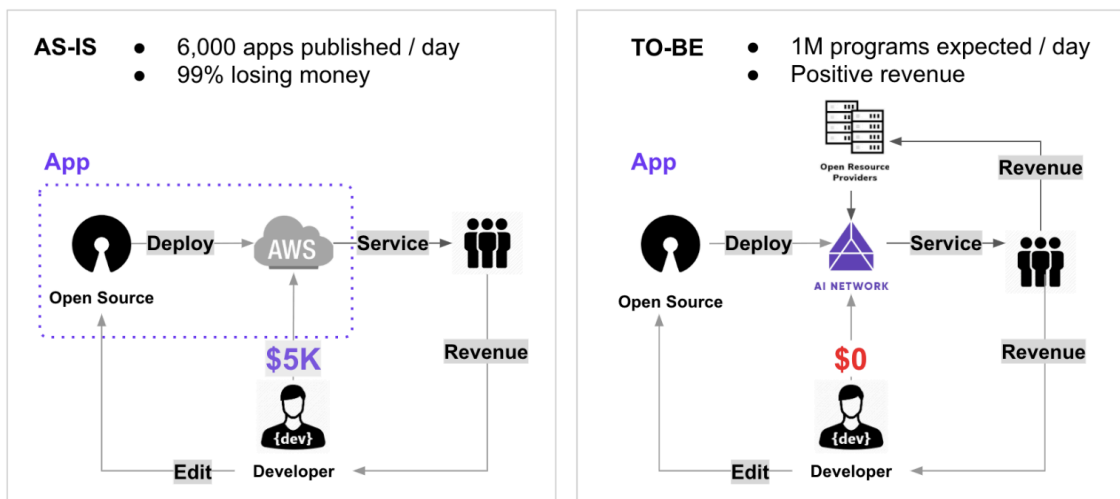
Fig 1. Decoupling the role of resource providers from the role of developers can boost the number of
programs published as developers no longer have to worry about maintaining application runtime
Environments

Through this shift towards Open Resource, we expect composability and interoperability of solutions to be significantly improved. Developers currently make use of third-party solutions through the API economy, which exposes organizations' digital assets via application programming interfaces (APIs).

However, there are two salient problems with the current API economy :

● There currently exists no sound payment system for computers to pay with for the globalized micro API executions.
● Ownership belongs to API providers, allowing these providers to change charging policies or service structures at any time.
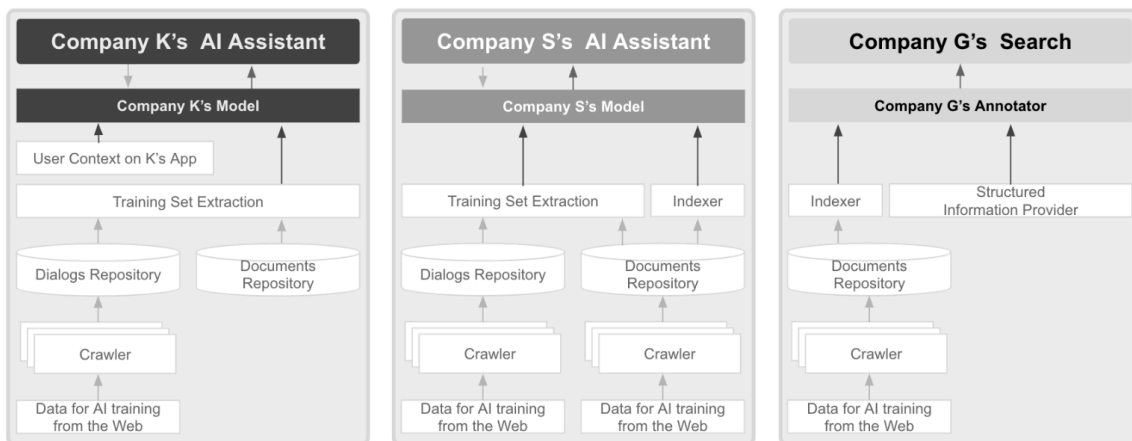

Fig 2. AS-IS: Each company is building its own AI solutions from scratch. Although lots of solutions are utilizing open source code, they are contained in the company's stack and cannot be shared externally.
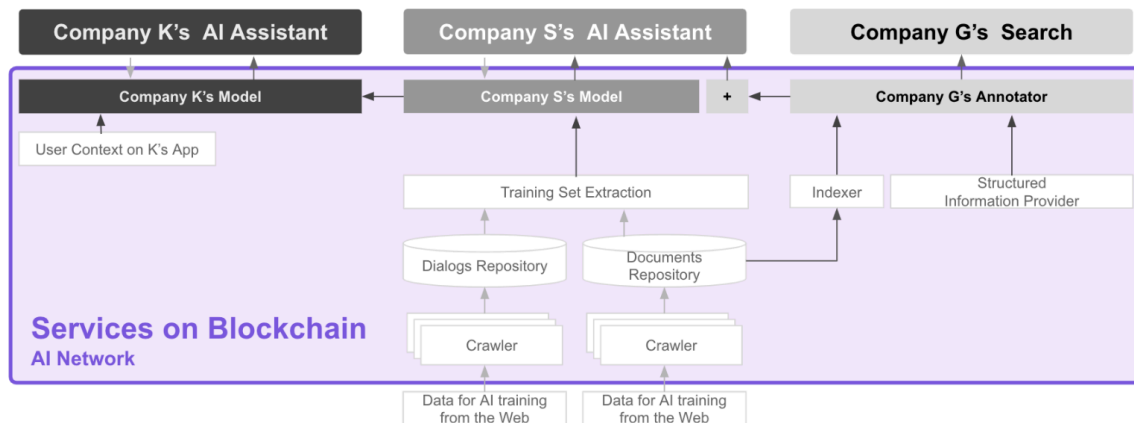
Fig 3. TO-BE: Components are shared as a service on the blockchain, and do not need to be separately deployed every time.

Blockchains and cryptocurrencies have a few unique properties that can potentially address some of the problems of API ownership. Blockchains ensure that no single participant controls the solution and allows anybody to utilize services on a blockchain through a protected access channel.

However, the performance of existing blockchain systems is not powerful enough to serve mainstream cloud services. Mass-market usage of existing blockchains is mainly focusing on financial use cases. To date, even the most elegant solution available is not scalable enough for general purpose computing. We believe that a highly concurrent system built upon trusted frameworks can deliver a lower-cost, more accessible, and more connected global cloud network.

The following are our beliefs and motivations for the Open Resource initiative.

- We believe that creative implementations of novel ideas should be publishable by developers, without consideration for computational resource restrictions.
- We believe that global, open, instant, low-cost, ownerless service will create immense opportunities for hosting programs globally.
- We believe that a global backend infrastructure should be designed and governed, just as public utilities.

- We believe that we all have a responsibility to help support ethical engineers and continuously uphold the integrity of the AI ecosystem. Integrity is especially
- crucial for immutable programs, which can only be killed by a consensus across all nodes.

Introducing Tyra Network

Tyra Network is a new kind of cloud service platform built on the foundation of blockchain
technology. Through this novel infrastructure, microservices developed by individual
developers can be instantly integrated into the network of computers. Tyra Network has
three characteristics to create a more intuitive backend system:
1. It is built on a concurrent, scalable, and reliable blockchain.
2. It is designed to serve applications, with quality guaranteed through a decentralized contract between developers and resource providers.
3. It is governed by the independent developer community, which aims to contribute to the evolution of the Open Source community.
Imagine an open, interoperable ecosystem of cloud services, built by developers and organizations to help operate global applications that people use on a daily basis. No single company owns these applications. Instead, developers all over the world contribute small parts of applications, thus making constant small improvements to the global applications that people around the world use every day. In order to achieve this long-term vision, the blockchain is built from the ground up to prioritize scalability, concurrency, and efficiency in computational throughput. The Tyra Network token is achieved through the "Tyra Network Blockchain." Our ecosystem's unit of token is called "TYR." TYR needs to be reserved when accessing deployed services on blockchain. To have confidence that its value will remain relatively stable over time, solution providers and resource providers agree on contracts, and a certain amount of TYR is deposited in order to guarantee this contract. Through these contracts, a significant portion of TYR will be deposited on blockchain building trust in its intrinsic value.

While the Tyra Network teams play a crucial role in the initial stage of the Tyra Network Blockchain protocol, the community of developers and resource providers hold the final decision-making authority. Tyra Network Blockchain is an open source project, whichallows millions of open source projects to maintain their services online.

Tyra Network blockchain is a permissionless blockchain, which means any computer in the world is free to participate as a validator node or a resource provider. Validators are responsible for verifying communication between developers and resource providers. Developers who initiate services are capable of configuring permission settings. This means only entities that meet specific requirements can be resource nodes for a certain deployed program. In summary, the Tyra Network blockchain composed of permissionless nodes records rules for service communication, and programs are then executed off the blockchain by resource providers who monitor the blockchain, following the communication rules agreed on the blockchain.

The Tyra Network Blockchain

The Tyra Network Blockchain is designed to provide secure access to computers connected to the network. This secure network will form a serverless computing architecture by utilizing accessible computers in the network. This section will highlight three requirements regarding the Tyra Network Blockchain:
1. Capable of processing any general programming language.
2. Capable of hosting heterogeneous types of clouds ranging from mobile phones
to supercomputers.
3. Real-time responses to transactions via asynchronous execution.

The goal of Tyra Network is to serve millions of open source projects. As such, the Tyra Network is designed for operating different types of software on the most suitable runtime environment. If the project is about deep learning, it might need a high performance GPU, or if the project is about sensor network, it might need

millions of small computers. Ethereum supports only one type of language called Solidity and its runtime environment is called EVM. Tyra Network runs a variety of languages on heterogeneous types of runtime environments. We refer to these environments as Secure Runtime Environment, or SRE for short. Tyra Network does not have a native smart contract language such as Solidity. Instead, workers in resource provider pools are listening to blockchain events to participate in the execution. Thus, blockchain's responsibility is narrowed down to propagating real-time events, and recording life cycle of executions.

Unlike the synchronous execution of the smart contract, the Tyra Network prioritizes
real-time execution over preserving execution order. This post-consensus protocol enables high transaction throughput, low latency, and high concurrency in processing transactions. Tyra Network's execution can be asynchronous, and the arrival of results may be different from the initiation order. Later results may get interrupted and dropped. As such, the blockchain plays a vital role in maintaining a consensus and keeping the consistent state among lists of conflicting executions.

Tyra Network Token

The Tyra Network token is a digital token designed both for humans and computers. It is designed to make computational costs more measurable. Using the blockchain protocol, TYR maintains stability during the execution of services by reserving computational power for a specific duration of time. This means that anyone with TYR tokens has a high degree of certainty that they can use their digital token for accessing valuable backend services.

This also means that one TYR will not always guarantee some fixed amount of GPUs or CPUs. Instead, the value of one TYR may fluctuate along with the value of the total computing power and solutions in the network. However, since contracts always hold a significant amount of total TYR at any time, the volatility of the token should be minimal. Therefore TYR holders can trust the token's ability to preserve value for processing agreed numbers of requests offered by the resource provider.

Fundamentally, an TYR token is a utility token that is used to purchase certain services available on the blockchain. In order to provide a stable service, the developer of the service initiates the contract with resource providers. Resource providers may then make a deposit, guaranteeing resource usage for a specific amount of time. After the contract, the resource provider can share the revenue of the service. This contract enables applications to have a stable backend, and decouples service quality from TYR price fluctuation. Eventually, depositing in contracts will play a pivotal role in token stabilization, allowing TYR to maintain consistent intrinsic value.

Tyra Network Governance

Tyra Network Governance is designed for Tyra Network Blockchain to be a global application backend that empowers millions of Open Source projects. The governing entity is the Tyra Ventures Pte Ltd, headquartered in Singapore. The organization is built to facilitate the operation, promotion, and development of the Tyra Network Blockchain through a consensus among the network's validator nodes, developers, and resource providers.

The organization will aid in keeping Tyra Network's participants in alignment with the network's technical roadmap and development goals. One of the main responsibilities of Tyra Network is to establish sustainable operation of Tyra Network open source projects as a non-profit entity. Tyra Network open source projects grow with the collaboration of decentralized communities based on contribution guidelines and protocols.

Conclusion

Reliable decentralized backend infrastructure can genuinely deliver the promise of a "World Computer."

Tyra Network is a collaborative backend for open source projects built on top of a scalable and stable blockchain, powered by diverse resource providers around the world, and governed by a global developer community. Together, we hope to

rediscover the collaborative power of open source, and solve some of the world's most difficult problems.