

EHR? WHY IS IT NOT GOOD ENOUGH?

Electronic Health Record (EHR) is a digital record of a patient's health information – it contains medical histories, treatment plans, and more. The EHR is essential in facilitating paperless health information that is easily shared and used by healthcare practitioners. However, current EHR systems are lacking in terms of privacy, security and data analytics – highlighting the need for a better, more complete solution that supports advanced predictive models.

Concerns		
Fragmented Health Records There are multiple EHR solutions in the market which are not compatible, leading to fragmented health records and information silos.	Centralisation EHR solutions use centralised private or cloud-based servers which are vulnerable to a single point of failure (SPOF) and to hacking/denial of service.	Lack Of Patient Ownership/Privacy Patients do not control access to their own health data and must rely on medical practitioners.

MEDILOT'S SOLUTION

How it works?

By using a dual blockchain solution with a unique layered architecture, MediLOT platform is able to incorporate Artificial Intelligence and Data Analytics capabilities on top of its control and data layers. This allows for machine learning APIs and complex applications to be built on top of MediLOT platform.

1. Decentralised

Based on distributed ledger technology, patients' data is stored in different locations, eliminating the risk of a single catastrophic breach.

2. Holistic

Every patient will have access to a complete longitudinal health record: their own health story that they can access anytime, anywhere.

3. Patient Centric

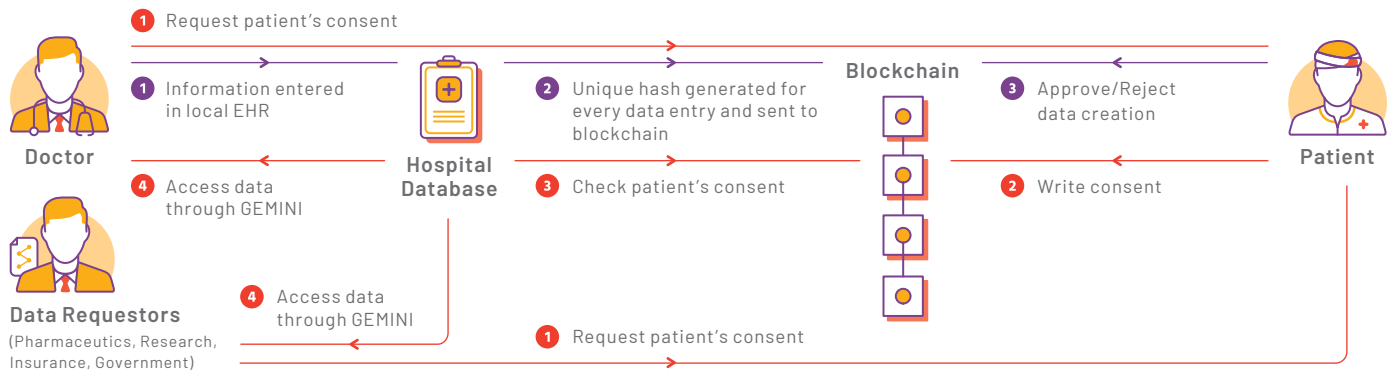
The patient holds his/her own private key and has fine control over who can view their health records.

4. Personalised

Using an advanced analytics overlay (GEMINI), MediLOT allows for predictive models to guide treatment strategies for individual patient.

Flowchart

Legend: — Data Generation Process — Data Request Process



The technology used in MediLOT has been developed **over 5 years** and published in more than..

20 Peer reviewed scientific publications



Technology

Analytics



GEMINI Short for **GE**neralisable **M**edical **I**nformation **a**nalysis and **I**ntegration Platform, is the overlying AI suite that supports big data analytics and enhances clinical decision making.

Blockchain



Hyperledger++ An enhanced Hyperledger with scalable consensus that improves throughput by 7 times.

Data Storage



ForkBase A Proprietary storage system with rich semantics, immutability and data sharing, built as a native storage system for Blockchain.

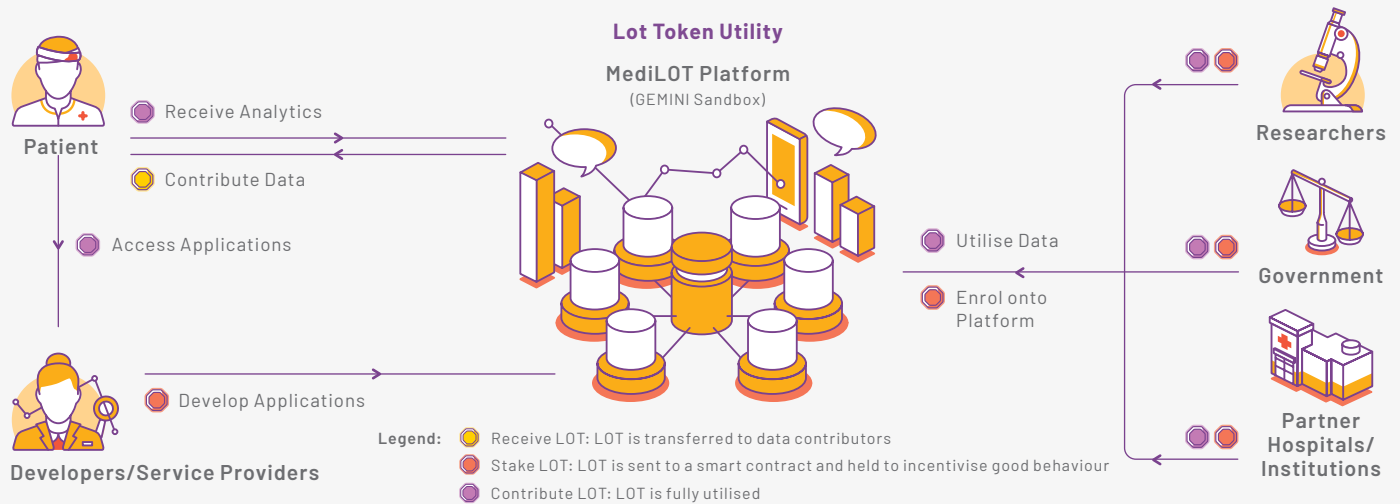
Competitor Analysis

	Patientory (PTOY)	MediBloc (MED)	MedicalChain (MTN)	MediLOT (LOT)	40+ man years of analytics research
Healthcare AI Analytics	Unknown	Unknown	Unknown	GEMINI - A platform for AI-assisted diagnosis based on EHR data, attested by extensive hospital practice.	
Provenance Query	Brute-force full scan	Brute-force full scan	Brute-force full scan	Semantics-oriented retrieval without incurring storage redundancy.	
Blockchain Architecture	Private-Ethereum	Public-QTUM	Dual-chain	Highly interoperable dual-chain: Hyperledger++ and Ethereum.	

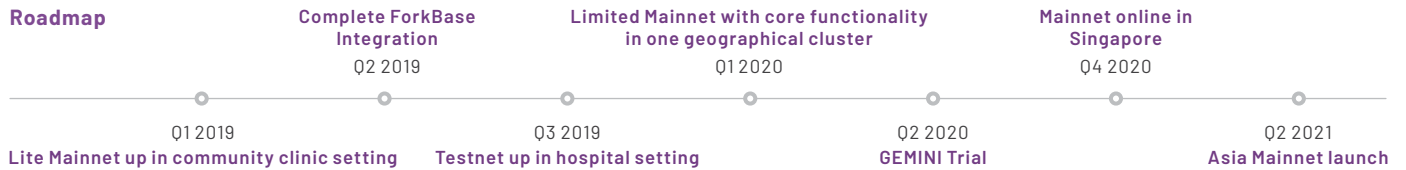
Token Distribution

MediLOT Tokens (LOT)

No. of Tokens: **2 Billion**
 Initial Token Sale: **400,000,000**
 Hard Cap: **7,000,000 USD**
 Token Price: **0.0175 USD**



Roadmap



Founders



Chair Professor Ooi Beng Chin FIEEE, FACM

Distinguished Professor, NUS
 Director, Smart Systems Institute, NUS
 Chang Jiang Professor, Zhejiang University, China
 Director, NUS AI Innovation and Commercialisation Centre, China
 Fellow of Singapore National Academy of Science

Awards/Expertise

- China Computer Federation Overseas Outstanding Contributions Award 2016
- Singapore President Science Award 2011



Dr Ngiam Kee Yuan

Group Chief Technology Officer, NUHS Corporate Office
 Assistant Professor, Department of Surgery,
 Director, Surgical Research and Development

Awards/Expertise

- Special Recognition Award, NUS 2015
- ExxonMobil-NUS Research Fellowship Award 2007



Dr Marcus Tan

Clinical Lecturer, NUS
 Medical Doctor, MBBS (Singapore), MMed (Ophth)

Awards/Expertise

- Invited speaker: Blockchain in Healthcare (Health Access International)
- Invited speaker: Infocomms Media Development Authority of Singapore (IMDA) - Blockchain Competition
- Young Teacher Award, YLLSOM 2017



Professor Zhang Meihui

Professor, Beijing Institute of Technology

Awards/Expertise

- Winner of National Thousand Young Talents Program 2018
- Big Data Analytics



Zhang Jiangwei

PhD Candidate, National University of Singapore

Awards/Expertise

- Data Generation and Analytics

The Team



A/Prof Xiao Xiaokui

Associate Professor,
National University of Singapore

Awards/Expertise

- Young Scientist Award in Physical/ Mathematical Science 2009
- Data Privacy and Security



Professor Zhang Dongxiang

Professor,
University of Electronic Science
and Technology of China

Awards/Expertise

- Query Optimisation
- Artificial Intelligence



Dr Cai Qingchao

Senior Research Fellow,
National University of
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Awards/Expertise

- Distributed Systems
- Big Data Processing



Dr Dinh Tien Tuan Anh

Senior Research Fellow,
National University of Singapore

Awards/Expertise

- System Security



Dr Andreea Costea

Research Fellow,
National University of Singapore

Awards/Expertise

- Software Verification of Critical Code
- Language Design
- Formalisation of Distributed Systems



Dr Dumitrel Loghin

Research Fellow,
National University of Singapore

Awards/Expertise

- Dean's Graduate Research Excellence Award, 2017
- Computer Systems Performance Analysis
- Parallel and Distributed Systems, Low-power ARM-based Systems, GPUs
- Big Data Analytics



Dr Lin Qian

Research Fellow,
National University of Singapore

Awards/Expertise

- Distributed Systems
- Real-time Data Processing



Dr Wang Sheng

Research Fellow,
National University of Singapore

Awards/Expertise

- Database Engines
- Distributed Systems
- AI Platforms
- ACM/ICPC World Finalist
- Apache Committer



Luo Zhaojing

PhD Candidate,
National University of Singapore

Awards/Expertise

- Healthcare Data Analytics
- Machine Learning/Deep Learning Regularisation



Ruan Pingcheng

PhD Candidate,
National University of Singapore

Awards/Expertise

- Blockchain Systems
- Data Provenance Analysis
- Database Systems



Tan Cheng

PhD Candidate,
National University of Singapore

Awards/Expertise

- Many-core Architectures
- Power Management
- Deep learning with Hardware Accelerators



Xie Zhongle

PhD Candidate,
National University of Singapore

Awards/Expertise

- Query Processing
- Indexing
- Distributed System



Zheng Kaiping

PhD Candidate,
National University of Singapore

Awards/Expertise

- Healthcare Data Analytics



Zhou Xuxuan

PhD Candidate,
Chinese University of Hong Kong

Awards/Expertise

- Blockchain
- Database Systems

Advisors



A/Prof James Yip

Group Chief Medical Informatics
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Associate Professor, Department
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Medicine, NUS, Senior Consultant,
Department of Cardiology, NUHCS,
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Co-Founder,
DigixGlobal
Founder, Ethereum
Singapore Meetup



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CO-Founder,
Shentilium
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Chief Investment Officer,
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Previously Head of
Offshore Asian Currency
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at Morgan Stanley



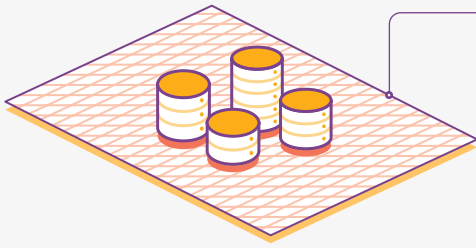
Wang Ping

CEO, Infinit HealthCare China
Infinit is a leading HealthTech
Company across 44 countries
& more than 3500 healthcare
institutions

Collaborators



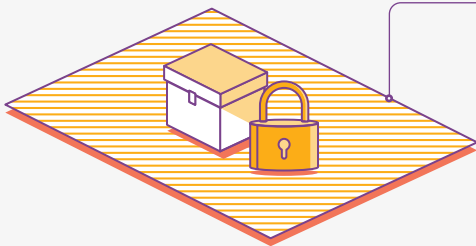
THE TECHNOLOGY



GEMINI

GEMINI is a **GE**neralisable **M**edical **I**nformation **a**nalysis and **I**ntegration Platform. The objective is to design and implement an integrative healthcare analytics system to address various kinds of healthcare problems. The systems integrated in GEMINI cover data acquisition, data cleaning, data integration, data processing, data analytics and data visualisation steps of the big data analytics pipeline.

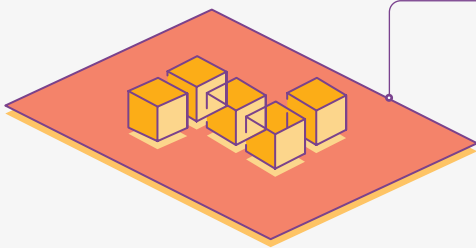
<http://www.comp.nus.edu.sg/~dbsystem/gemini/>



FORKBASE

ForkBase is a system that supports high-level properties demanded in many modern applications, including data versioning, collaboration and security. With its versatile programming interface, rich semantics and high performance, ForkBase enables rapid developments of many classes of scalable, distributed applications.

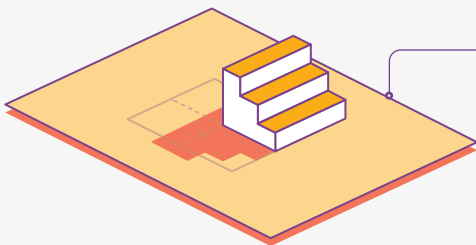
www.comp.nus.edu.sg/~dbsystem/forkbase/



BLOCKBENCH

BLOCKBENCH is the first evaluation framework for analysing private blockchains. It serves as a fair means of comparison for different platforms and enables deeper understanding of different system design choices. BLOCKBENCH measures overall and componentwise performance in terms of throughput, latency, scalability and fault-tolerance. Private chains, including Ethereum, Hyperledger Fabric, Parity and Quorum can be easily integrated to BLOCKBENCH via simple APIs to conduct comprehensive evaluation.

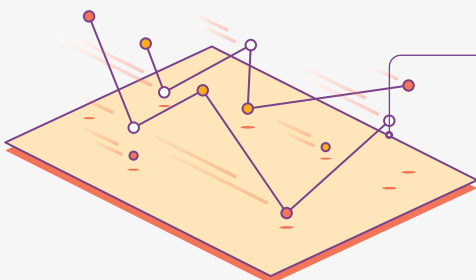
<http://www.comp.nus.edu.sg/~dbsystem/blockbench/>



APACHE SINGA

Apache SINGA is an Apache Incubating project for developing an open source machine learning library. It provides a flexible architecture for scalable distributed training, is extensible to run over a wide range of hardware, and has a focus on healthcare applications.

<http://www.comp.nus.edu.sg/~dbsystem/singa/>



HYPERLEDGER++

Hyperledger++ is an enhanced blockchain infrastructure of Hyperledger. It uses trusted hardware to improve trust relation between nodes and its throughput by a wide margin.

<http://www.comp.nus.edu.sg/~dbsystem/hyperledger++/>

FOODLG

Food(Ig) is a food journaling, nutrition tracking and analytics app on the patient's diet, by simply taking pictures of what the patient has eaten. Powered by a deep learning framework that learns the food type from image "pixels", and based on standard nutritional guidelines and food composition data from the Health Promotion Board (HPB), Food(Ig) calculates the patient's daily nutrient estimates with the journaled entries for achieving a well-balanced diet.



<http://www.foodlg.com/>