

开源通用区块链框架

HyperLedger Fabric



熊伟伦

2017/9/27 上海交通大学区块链沙龙

自我介绍

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Android

- 移动 DevOps 平台 Appetizer.io
- 两项 Android 字节码插桩程序分析发明专利
- Magic 音乐手套 —— 首届全国大学生物联网设计竞赛特等奖

Node

- Node.js Egg.js 核心项目源码贡献，维护多个 Egg.js 插件
- 开发十多个目前在线上运行的 Node 项目

区块链研究，Web 开发

新闻 笑话？未来畅想！

智能穿戴大数据区块链走地鸡

寿县茶庵镇推动区块链养殖 品质数字记录

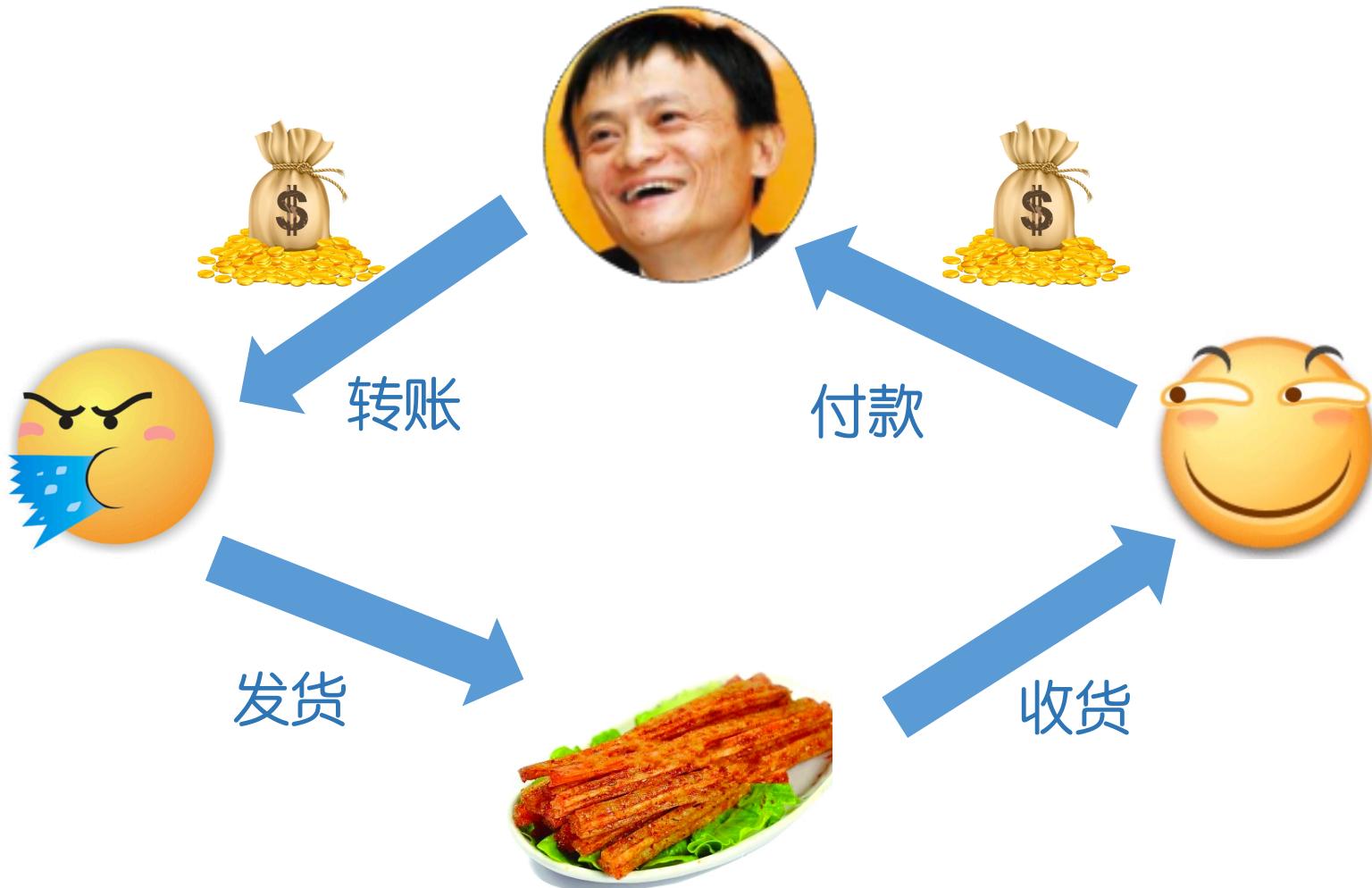
鸡戴“运动手环”步数上传区块链

时间：2017-09-20 01:36:19



茶庵镇鸡场预计将养殖12000只鸡，每一只鸡都佩戴了物联网身份证——鸡牌，这大概就相当于它们的“运动手环”。除了鸡的地理位置和计步信息之外，鸡苗入栏、到成鸡、经屠宰运输等，直至用户餐桌的全过程的数据信息都将被计入鸡牌之中。“比如，我们把鸡从入栏到成鸡每一天的气温、空气湿度、污染物、土壤相关的指标如温湿度、鸡只饮用水、空气污染情况都记录下来。”许国亮表示：“因为鸡的生长环境直接影响它的品质。”

中心化记账



区块链系统

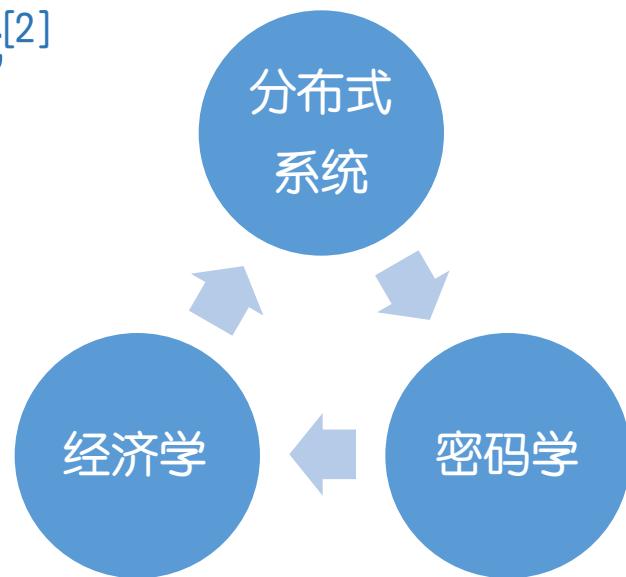
2008年下：理论源于中本聪在 metzdowd.com 密码学邮件组发表的《比特币：一种点对点的电子现金系统》^[1]

2009年1月3日：比特币网络上线，中本聪开源第一版客户端

截止目前一个比特币价格 23000 元^[2]

最大规模的经济学实验

成为历史？ 成为未来？



[1] <https://bitcoin.org/bitcoin.pdf>

[2] <https://www.chbtc.com>

区块链系统

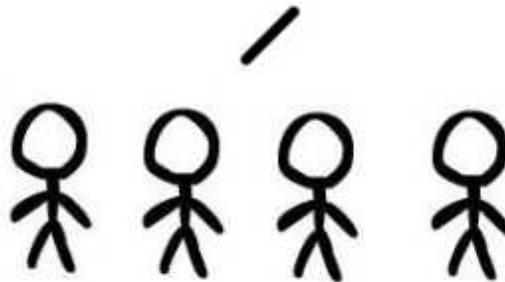
我是A，我借给了B
100块钱！



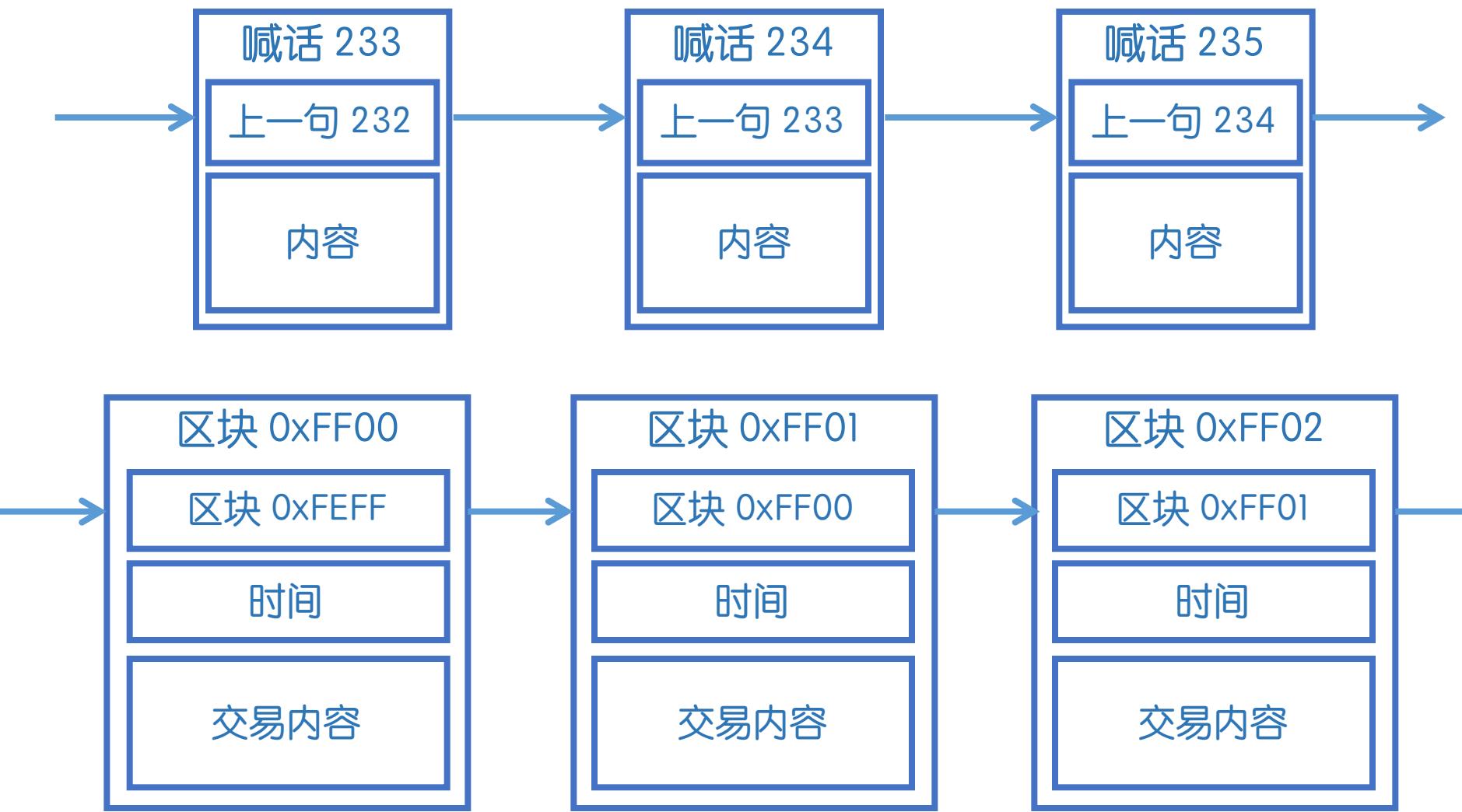
我是B，A借给了我
100块钱！



A借给了B 100块钱！



区块链系统



公有链是火

联盟链是冰



公有链 & 联盟链

矿工 PoW PoS



机构/企业联盟

银行 A

银行 B

银行 C

.....

银行 Z

Trust

HyperLedger

IBM 牵头的区块链相关开源项目集合 归属 Linux 基金会
上百家国内外企业，包括招商银行、华为、万达

Hyperledger 管理的业务区块链框架

Burrow

Hyperledger Burrow是一个模块化的、带经过许可的智能合约解释器的区块链客户端，它部分采用了以太坊虚拟机（EVM）的技术规范。

Fabric

Hyperledger Fabric 是区块链技术的实现，目标是成为开发区块链应用和解决方案的基础。

Iroha

Hyperledger Iroha 是一个分布式账本项目，用于简单和容易地并入需要分布式账本技术的基础设施项目。

Sawtooth

Hyperledger Sawtooth是模块化区块链套件，具有多功能和高扩展性的特点。

Indy

Hyperledger Indy 提供了工具、程序库和可重复使用的组件，用于提供基于区块链或者其他分布式账本的数字身份。

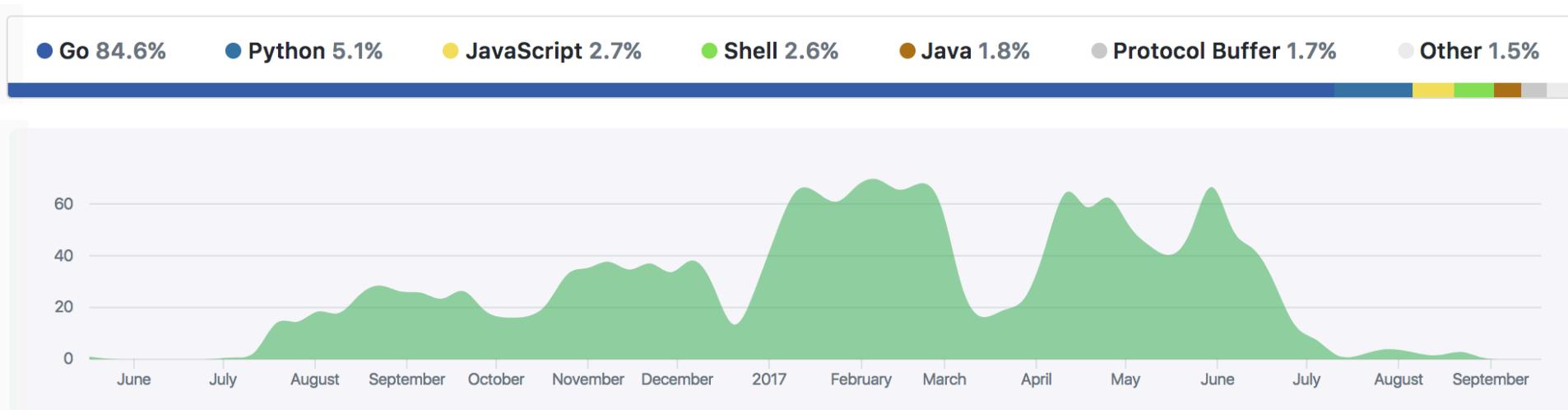


了解更多 **Hyperledger 项目信息**

Fabric

HyperLedger Fabric 是一个分布式记账平台^[1]
联盟链通用框架

<https://github.com/hyperledger/fabric>



[1] <https://hyperledger-fabric.readthedocs.io/en/latest/>

Fabric

2016年5月：IBM 牵头立项，开发联盟链通用框架

2016年9月：v0.6 第一个 release 版本发布

2017年7月：v1.0 稳定版发布，架构变化巨大

2017年9月：v1.0.2 发布，项目持续演进

.....

Fabric

3分钟官方视频^[1]

[1] <https://www.youtube.com/watch?v=EKa5Gh9whgU>

Fabric 1.0 主要信息

Go 语言实现整个系统，推荐 Docker 容器化部署

SDK 提供 Node 和 Java 版本，后续支持 Python Go

共识算法：Pow PoS PBFT Raft

支持标准的事务模型（undo redo）

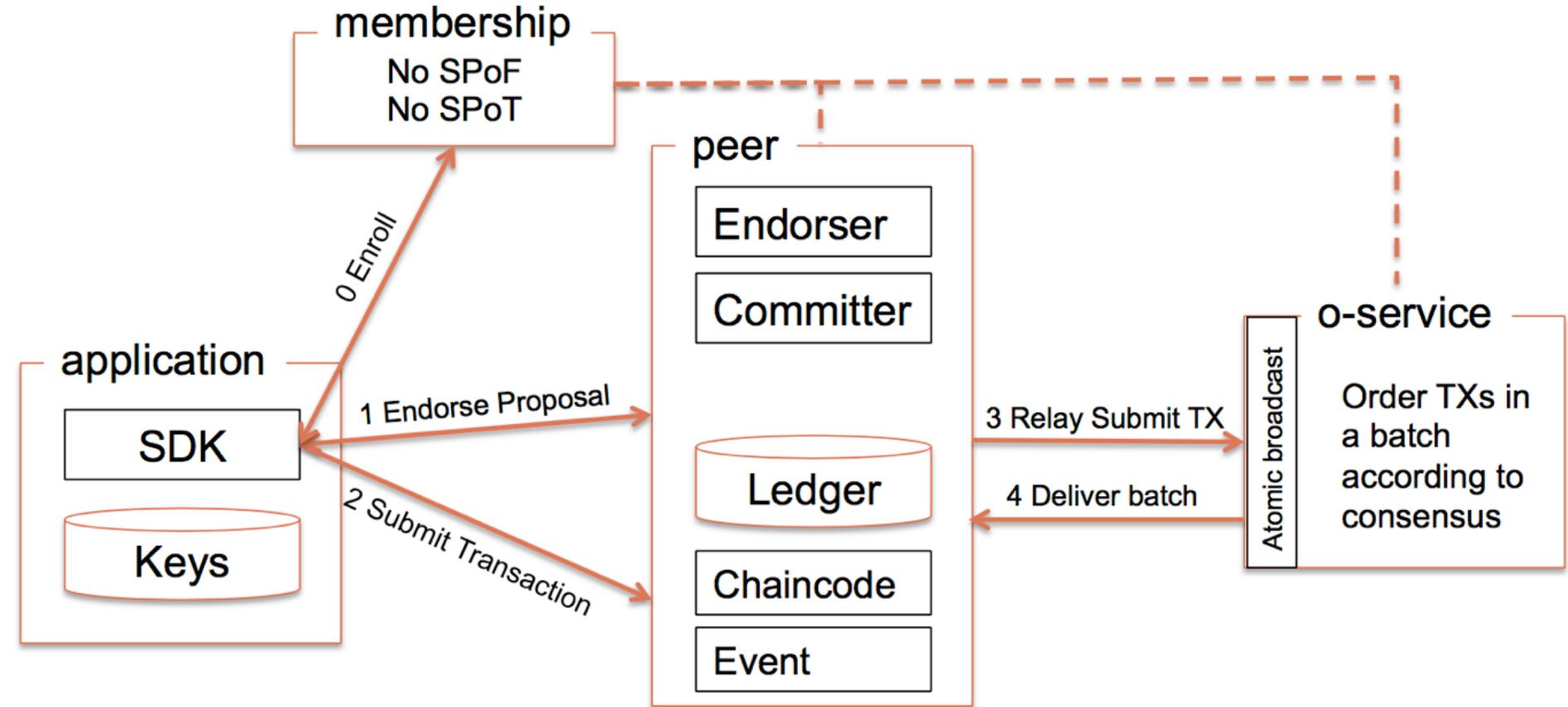
每个区块存储的事物数量可配置

加密算法模块化，可自行开发替换

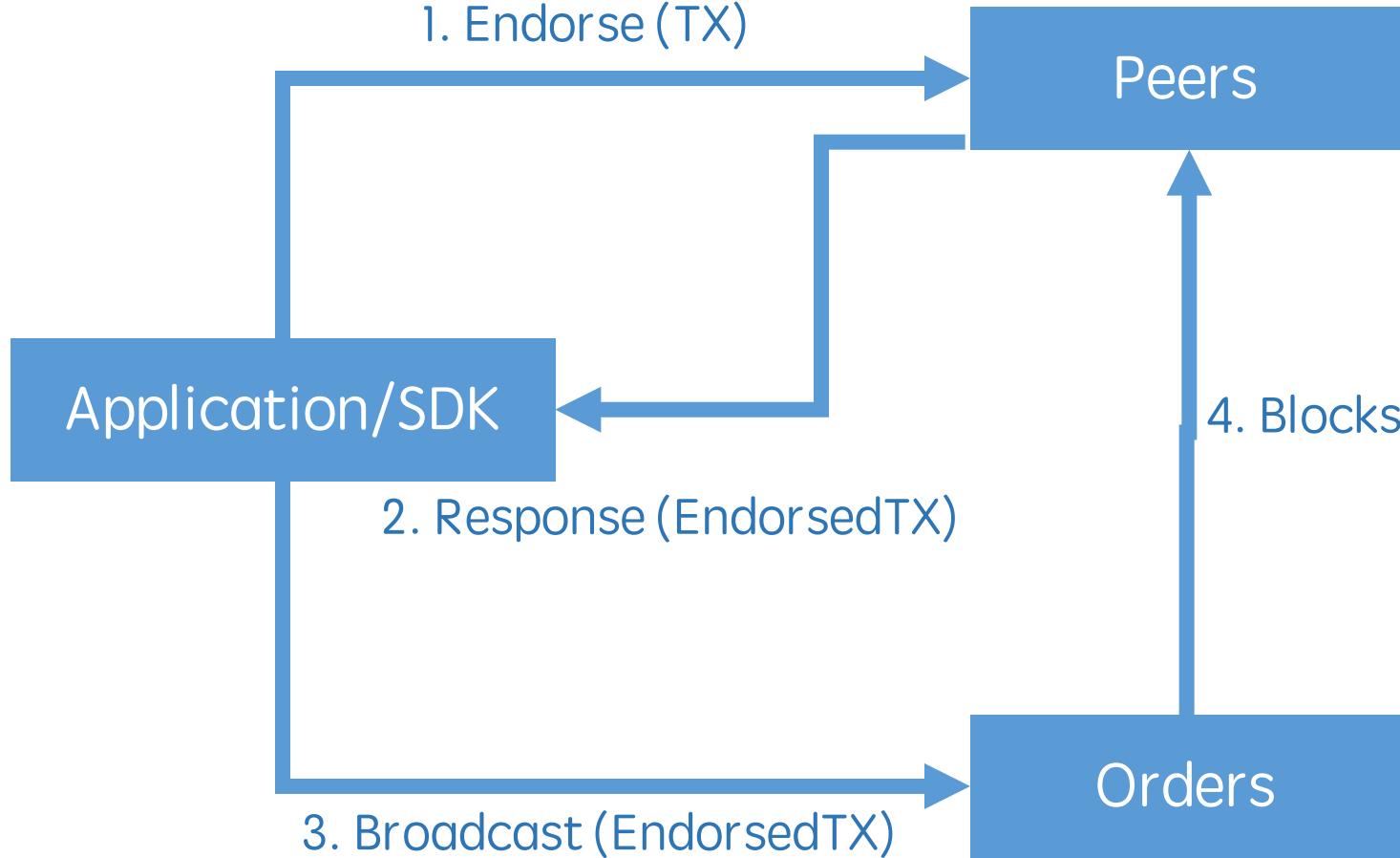
Fabric 1.0 系统架构名词

- Peer: 节点, 独立的一个机构/一台机器
- Endorse Peer: 背书节点, 存储区块
- Order Peer: 订阅节点, 执行共识
- Commit Peer: 执行业务逻辑, 验证交易有效性
- Channel: 链的通道, 用于不同业务的隔离
- Ledger: 账本, 具体的交易数据内容
- State: 一次交易的事物 (Transaction) 状态

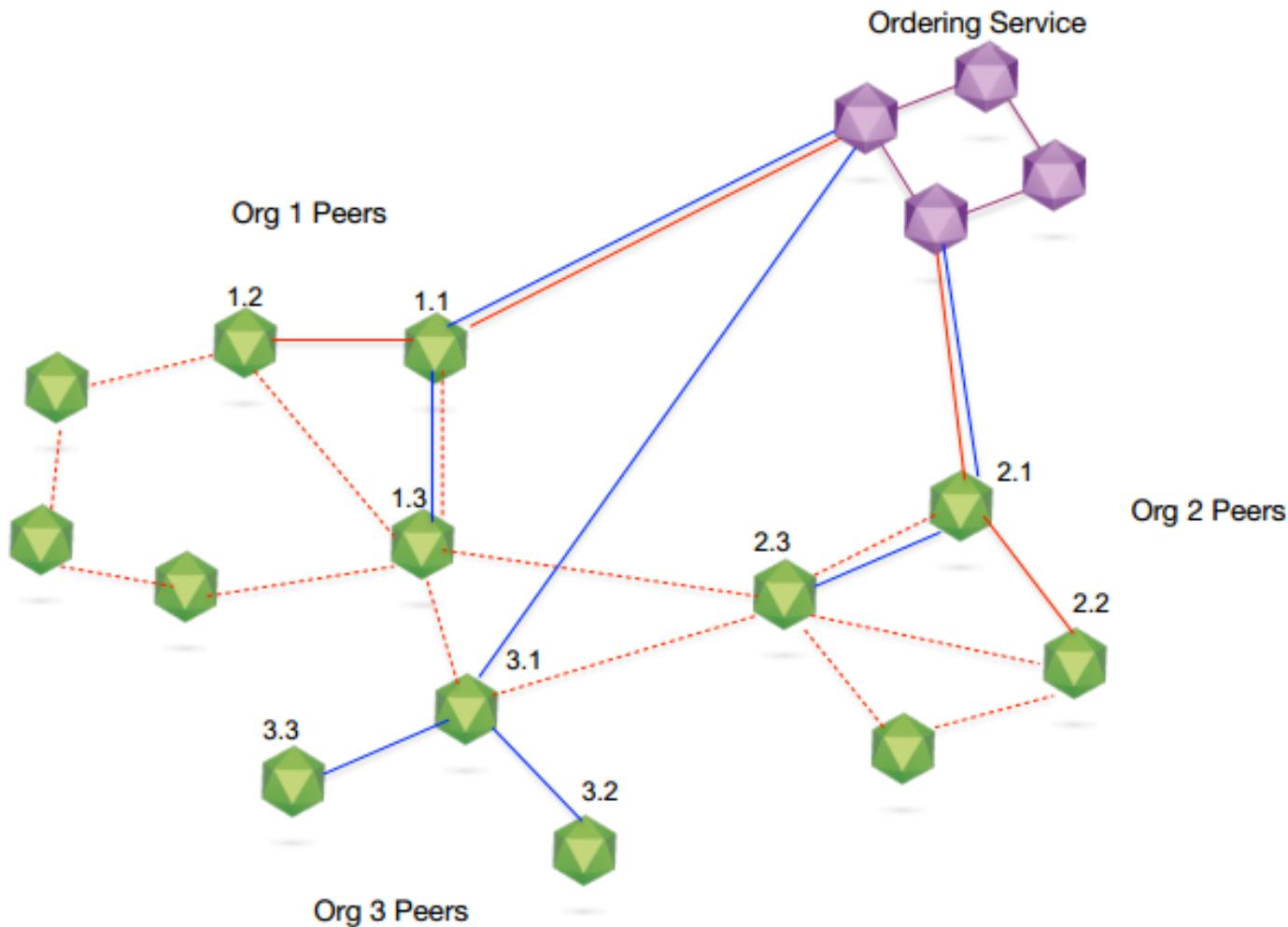
Fabric 1.0 系统架构



Fabric 1.0 简易交易流程



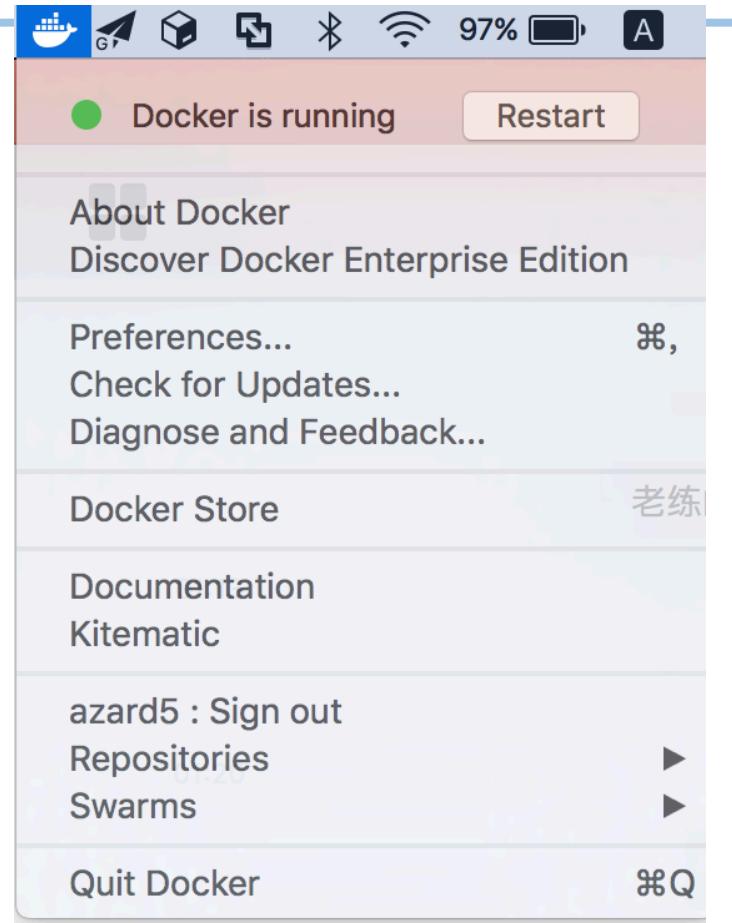
Fabric 1.0 多链功能



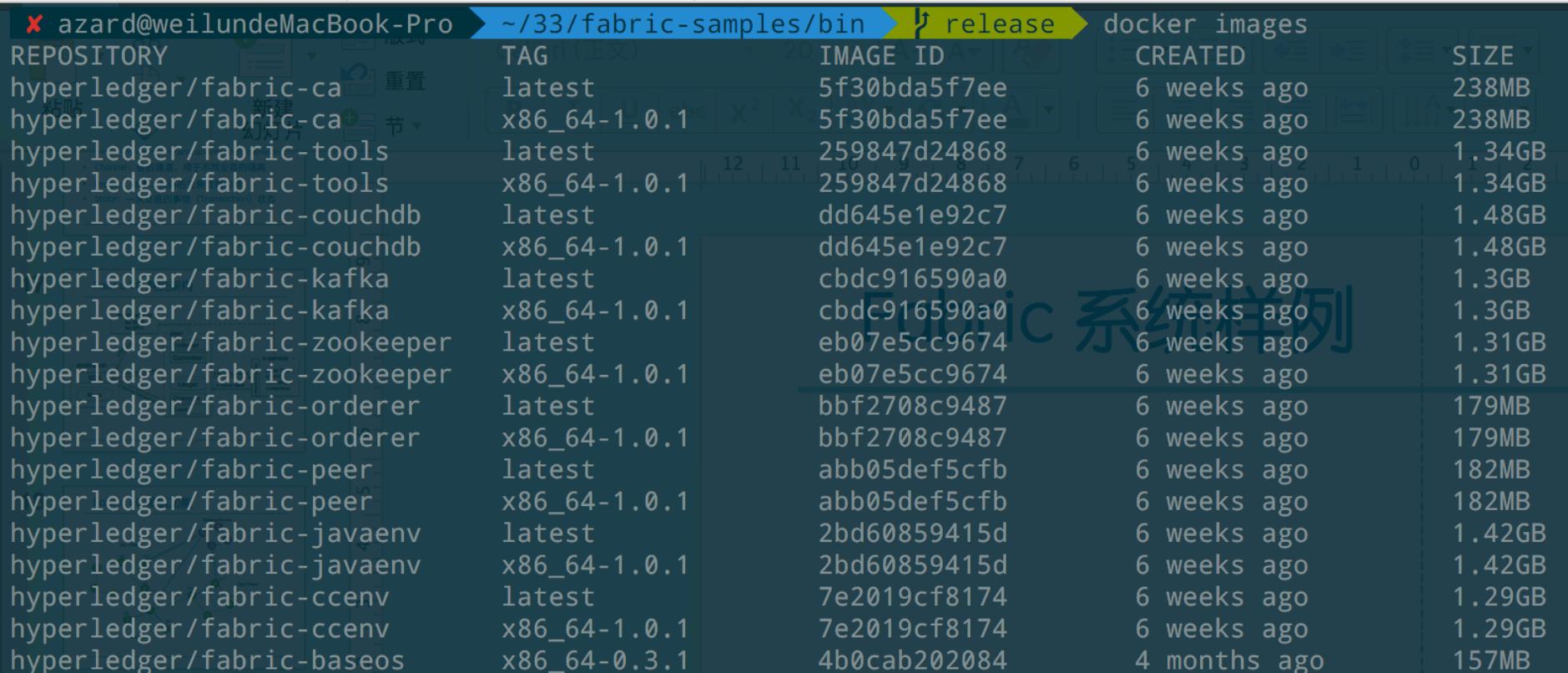
Fabric 系统样例

- Docker v1.14+
- Go v1.9.x
- Node v7.x

```
git clone  
https://github.com/  
hyperledger/fabric-samples.git  
cd fabric-samples  
curl -sSL https://goo.gl/Gci9ZX | bash
```



Fabric 系统样例



A screenshot of a terminal window showing the output of a command to list Docker images. The command was run from a directory containing 'bin' scripts, likely for fabric-samples. The images listed are from the 'hyperledger/fabric-' repository, specifically for x86_64-1.0.1 and latest tags. The table includes columns for REPOSITORY, TAG, IMAGE ID, CREATED, and SIZE.

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
hyperledger/fabric-ca	latest	5f30bda5f7ee	6 weeks ago	238MB
hyperledger/fabric-ca	x86_64-1.0.1	5f30bda5f7ee	6 weeks ago	238MB
hyperledger/fabric-tools	latest	259847d24868	6 weeks ago	1.34GB
hyperledger/fabric-tools	x86_64-1.0.1	259847d24868	6 weeks ago	1.34GB
hyperledger/fabric-couchdb	latest	dd645e1e92c7	6 weeks ago	1.48GB
hyperledger/fabric-couchdb	x86_64-1.0.1	dd645e1e92c7	6 weeks ago	1.48GB
hyperledger/fabric-kafka	latest	cbdc916590a0	6 weeks ago	1.3GB
hyperledger/fabric-kafka	x86_64-1.0.1	cbdc916590a0	6 weeks ago	1.3GB
hyperledger/fabric-zookeeper	latest	eb07e5cc9674	6 weeks ago	1.31GB
hyperledger/fabric-zookeeper	x86_64-1.0.1	eb07e5cc9674	6 weeks ago	1.31GB
hyperledger/fabric-orderer	latest	bbf2708c9487	6 weeks ago	179MB
hyperledger/fabric-orderer	x86_64-1.0.1	bbf2708c9487	6 weeks ago	179MB
hyperledger/fabric-peer	latest	abb05def5cfb	6 weeks ago	182MB
hyperledger/fabric-peer	x86_64-1.0.1	abb05def5cfb	6 weeks ago	182MB
hyperledger/fabric-javavenv	latest	2bd60859415d	6 weeks ago	1.42GB
hyperledger/fabric-javavenv	x86_64-1.0.1	2bd60859415d	6 weeks ago	1.42GB
hyperledger/fabric-ccenv	latest	7e2019cf8174	6 weeks ago	1.29GB
hyperledger/fabric-ccenv	x86_64-1.0.1	7e2019cf8174	6 weeks ago	1.29GB
hyperledger/fabric-baseos	x86_64-0.3.1	4b0cab202084	4 months ago	157MB

docker run hyperledger/fabric-peer

azard@weilundeMacBook-Pro ~/33/fabric-samples/bin > release docker run hyperledger/fabric-peer

2017-09-24 18:02:22.003 UTC [nodeCmd] serve -> INFO 001 Starting peer:

Version: 1.0.1
Go version: go1.7.5
OS/Arch: linux/amd64
Chaincode:
Base Image Version: 0.3.1
Base Docker Namespace: hyperledger
Base Docker Label: org.hyperledger.fabric
Docker Namespace: hyperledger

2017-09-24 18:02:22.003 UTC [ledgermgmt] initialize -> INFO 002 Initializing ledger mgmt
2017-09-24 18:02:22.003 UTC [kvledger] NewProvider -> INFO 003 Initializing ledger provider
2017-09-24 18:02:22.025 UTC [kvledger] NewProvider -> INFO 004 ledger provider Initialized
2017-09-24 18:02:22.025 UTC [ledgermgmt] initialize -> INFO 005 ledger mgmt initialized
2017-09-24 18:02:22.028 UTC [nodeCmd] createChaincodeServer -> WARN 006 peer.chaincodeListenAddress is not set, use peer.listenAddress 0.0.0.0:7051
2017-09-24 18:02:22.028 UTC [eventhub_producer] start -> INFO 007 Event processor started
2017-09-24 18:02:22.029 UTC [chaincode] NewChaincodeSupport -> INFO 008 Chaincode support using peerAddress: 0.0.0.0:7051
2017-09-24 18:02:22.030 UTC [scapi] RegisterSysCC -> INFO 009 system chaincode cscc(github.com/hyperledger/fabric/core/scc/cscc) registered
2017-09-24 18:02:22.031 UTC [scapi] RegisterSysCC -> INFO 00a system chaincode lscc(github.com/hyperledger/fabric/core/scc/lscc) registered
2017-09-24 18:02:22.031 UTC [scapi] RegisterSysCC -> INFO 00b system chaincode escc(github.com/hyperledger/fabric/core/scc/escc) registered
2017-09-24 18:02:22.031 UTC [scapi] RegisterSysCC -> INFO 00c system chaincode vscc(github.com/hyperledger/fabric/core/scc/vscc) registered
2017-09-24 18:02:22.032 UTC [scapi] RegisterSysCC -> INFO 00d system chaincode qsc(github.com/hyperledger/fabric/core/chaincode/qsc) registered
2017-09-24 18:02:22.032 UTC [gossip/service] func1 -> INFO 00e Initialize gossip with endpoint 0.0.0.0:7051 and bootstrap set [127.0.0.1:7051]
2017-09-24 18:02:22.033 UTC [msp] DeserializeIdentity -> INFO 00f Obtaining identity
2017-09-24 18:02:22.036 UTC [msp] DeserializeIdentity -> INFO 010 Obtaining identity
2017-09-24 18:02:22.039 UTC [gossip/discovery] NewDiscoveryService -> INFO 011 Started { [] [67 181 12 96 5 25 105 52 159 240 246 1 207 206 198 61 171 79 237 138 206 88 106 82 134 166 193 46 100 156 71 90] 0.0.0.0:7051} incTime is 1506276142038304362
2017-09-24 18:02:22.039 UTC [gossip/gossip] NewGossipService -> INFO 012 Creating gossip service with self membership of { [] [67 181 12 96 5 2 5 105 52 159 240 246 1 207 206 198 61 171 79 237 138 206 88 106 82 134 166 193 46 100 156 71 90] 0.0.0.0:7051}
2017-09-24 18:02:22.040 UTC [msp] DeserializeIdentity -> INFO 013 Obtaining identity
2017-09-24 18:02:22.042 UTC [gossip/gossip] NewGossipService -> WARN 014 External endpoint is empty, peer will not be accessible outside of its organization
2017-09-24 18:02:22.042 UTC [gossip/gossip] start -> INFO 015 Gossip instance 0.0.0.0:7051 started
2017-09-24 18:02:22.043 UTC [cscc] Init -> INFO 016 Init CSCC
2017-09-24 18:02:22.043 UTC [scapi] deploySysCC -> INFO 017 system chaincode cscc(github.com/hyperledger/fabric/core/scc/cscc) deployed
2017-09-24 18:02:22.044 UTC [scapi] deploySysCC -> INFO 018 system chaincode lscc(github.com/hyperledger/fabric/core/scc/lscc) deployed
2017-09-24 18:02:22.045 UTC [escc] Init -> INFO 019 Successfully initialized ESCC
2017-09-24 18:02:22.045 UTC [scapi] deploySysCC -> INFO 01a system chaincode escc(github.com/hyperledger/fabric/core/scc/escc) deployed
2017-09-24 18:02:22.046 UTC [scapi] deploySysCC -> INFO 01b system chaincode vscc(github.com/hyperledger/fabric/core/scc/vscc) deployed
2017-09-24 18:02:22.046 UTC [qsc] Init -> INFO 01c Init QSCC
2017-09-24 18:02:22.046 UTC [scapi] deploySysCC -> INFO 01d system chaincode qsc(github.com/hyperledger/fabric/core/chaincode/qsc) deployed
2017-09-24 18:02:22.046 UTC [nodeCmd] initSysCCs -> INFO 01e Deployed system chaincodess
2017-09-24 18:02:22.047 UTC [nodeCmd] serve -> INFO 01f Starting peer with ID=[name:"jdoe"], network ID=[dev], address=[0.0.0.0:7051]
2017-09-24 18:02:22.048 UTC [nodeCmd] serve -> INFO 020 Started peer with ID=[name:"jdoe"], network ID=[dev], address=[0.0.0.0:7051]

Fabric 系统样例

谢谢！