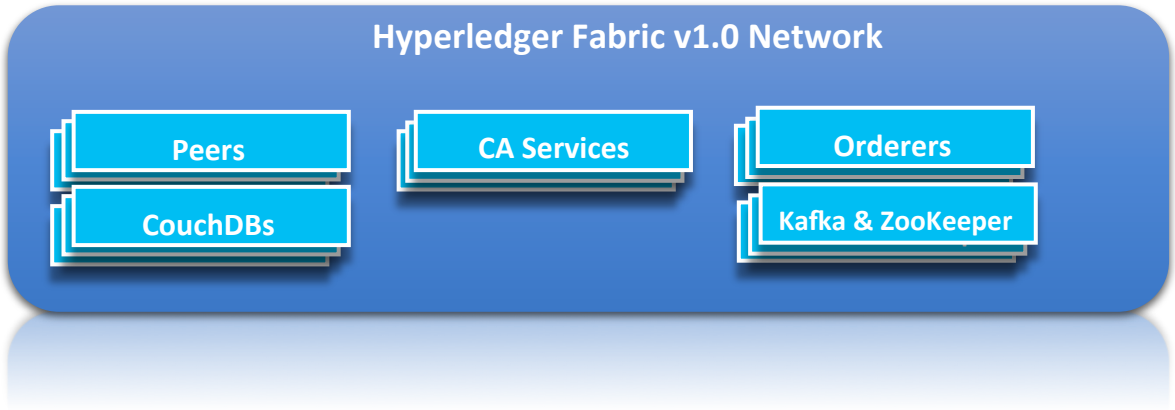
Blockchain-as-a-Service based on Kubernetes Solution Sharing

IBM China Development Lab (CDL) Emerging Technology Institute (ETI)
Jian Wu Dai (daijianw@cn.ibm.com)
Shan Yu (yushan@cn.ibm.com)

Rapid development of Blockchain brings both opportunities and challenges

- **Blockchain is getting popular in both China and also globally during the past years, and drawing very high attention, which brings great market opportunities**
  - Governments and relevant regulatory and standards organizations pay great attention to Blockchain technology
  - The pioneers of various financial institutions and other industries have been engaged in research and technical testing and experimental projects
  - Enterprise level IT companies start to lead and support open source Blockchain projects and platforms landing
  - Blockchain-related start-up companies boom as mushrooming, venture capital investment is also very active
  - Various blockchain-related business and technology alliances have emerged such as Hyperledger & EEA

Blockchain landing faces a series of challenges

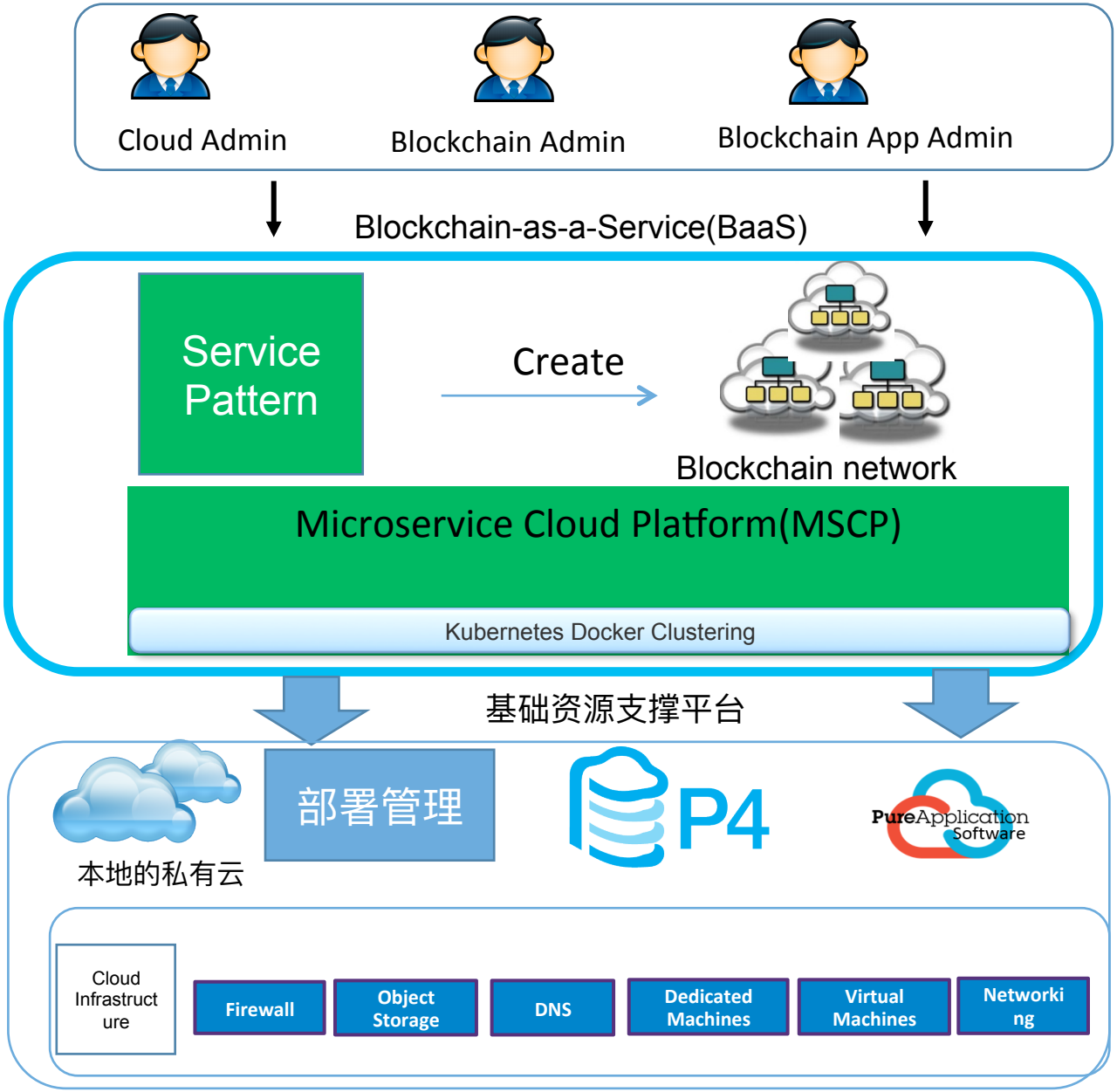


- **Business Challenges**
  - How to find the right business scenarios and still lacks of clear business model
  - How to effectively integrate a large number of participants to build a Blockchain business alliance (who leads, who builds, who operates etc.)
  - Regulatory and standards have yet to be established and refined
- **Technical Challenges**
  - The basic Blockchain technology platform is still in the early stages of development, it will take some time to be stable and production ready
  - The better usability and friendliness of existing platforms and tools need to be improved
  - There is no end-to-end Blockchain platform solution on the market to solve the challenges of efficient operation, scaling and monitoring of Blockchain networks.
- **Talent Challenges**
  - Lack of talents whose have both Blockchain specific skills (distributed database, cryptography, smart contract, consensus algorithm, etc.) and supported technical skills (network, docker…etc)

Blockchain-as-a-Service platform provides

- **End to end Blockchain solution**
  - Full stack supporting from Iaas,Paas, to Blockchain application
- **Fast provisioning of Blockchain network with High Availability**
  - Kubernetes docker clustering based Hyberledger Fabric HA network
    - HA for Peer, Orderer and CA nodes by default
- **Systematic security Assurance**
  - Management security
  - Ledger security
  - Network security
  - Transaction security
- **Full operation service**
  - DevOps service for Chaincode application deployment
  - Full log management from platform to Blockchain application
  - Full monitoring capability from platform to Blockchain application

End-to-End Blockchain-as-a-Service Solution



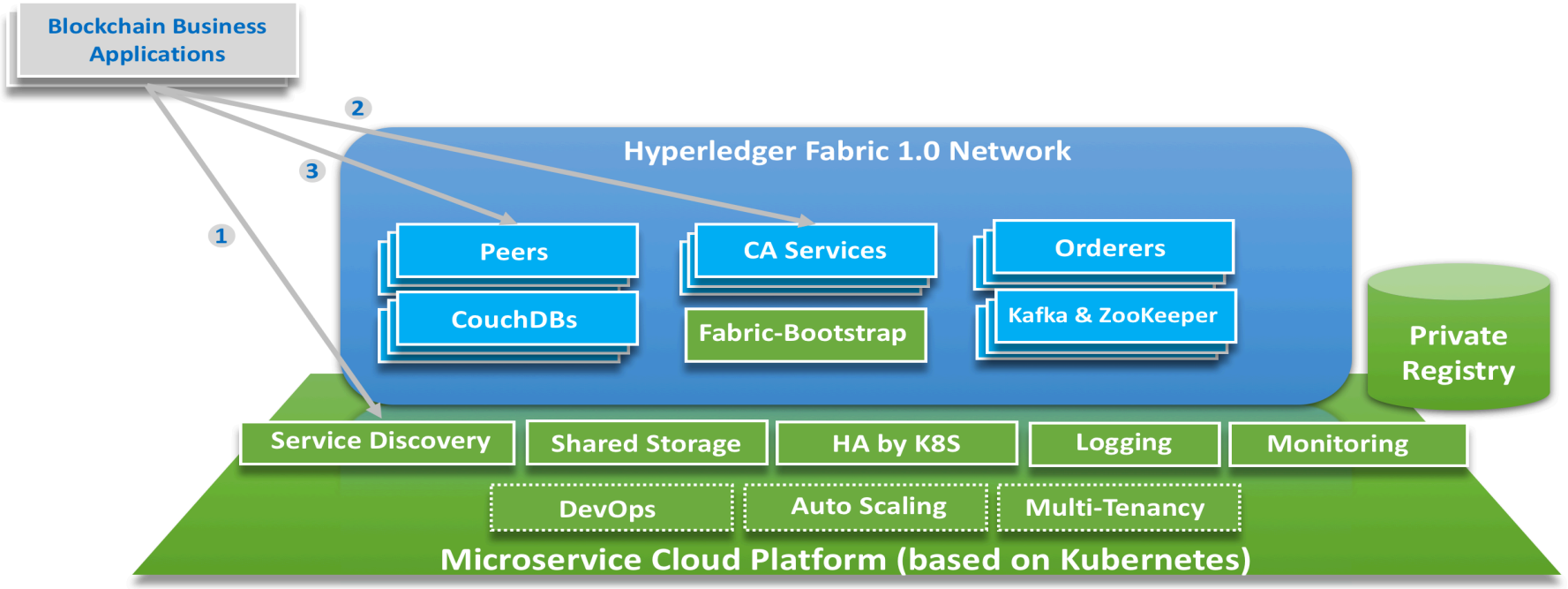
- BaaS
- Blockchain network created by service pattern template and run on MSCP cloud platform.
- MSCP

-Provide Blockchain network topology support based on kubernetes docker clustering

- Distributed storage to avoid configuration and transaction data loss
- DevOps service support to speed up Blockchain Apps online
- Provide overall Operation Model and tools(logging, monitoring…)
- Integration with P4 and PureApp for various infrastructure resources support

- P4/PureApp
- Infrastructure platform support

Blockchain-as-a-Service Solution: From Developer-Ready to Enterprise-Ready



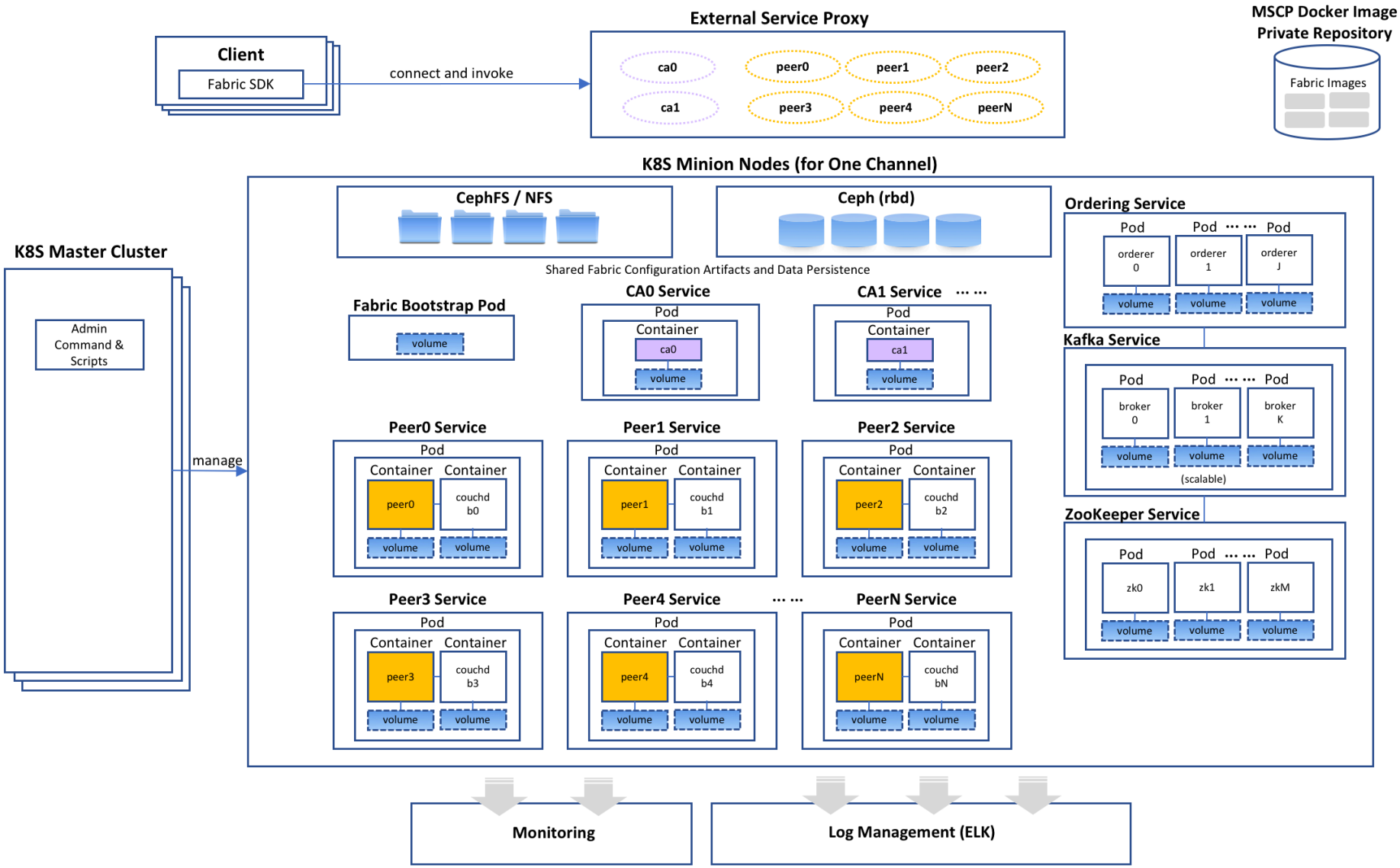
Blockchain-as-a-Service (BaaS) on Microservice Cloud Platform (MSCP)

- **Integrates with Kubernetes and leverages its High Availability and Auto Scaling capabilities**
  - HA for Master Nodes
  - Shared storage with HA for data persistence
  - Resilience of all nodes/pods in case of failure
  - Auto scaling based on metrics like CPU usage

- Fast, flexible pattern-based provisioning by MSCP
  - Out of box Blockchain HA network topology with security enabled
  - Sample SDK programs and CLI scripts

- Out-of-box capabilities provided by MSCP for enterprise-ready
  - Service Discovery, Shared Storage, Logging, Monitoring, DevOps, Multi-Tenancy, etc

Blockchain network based on Hyperledger Fabric 1.0 and Kubernetes



Provide System Security Assurance

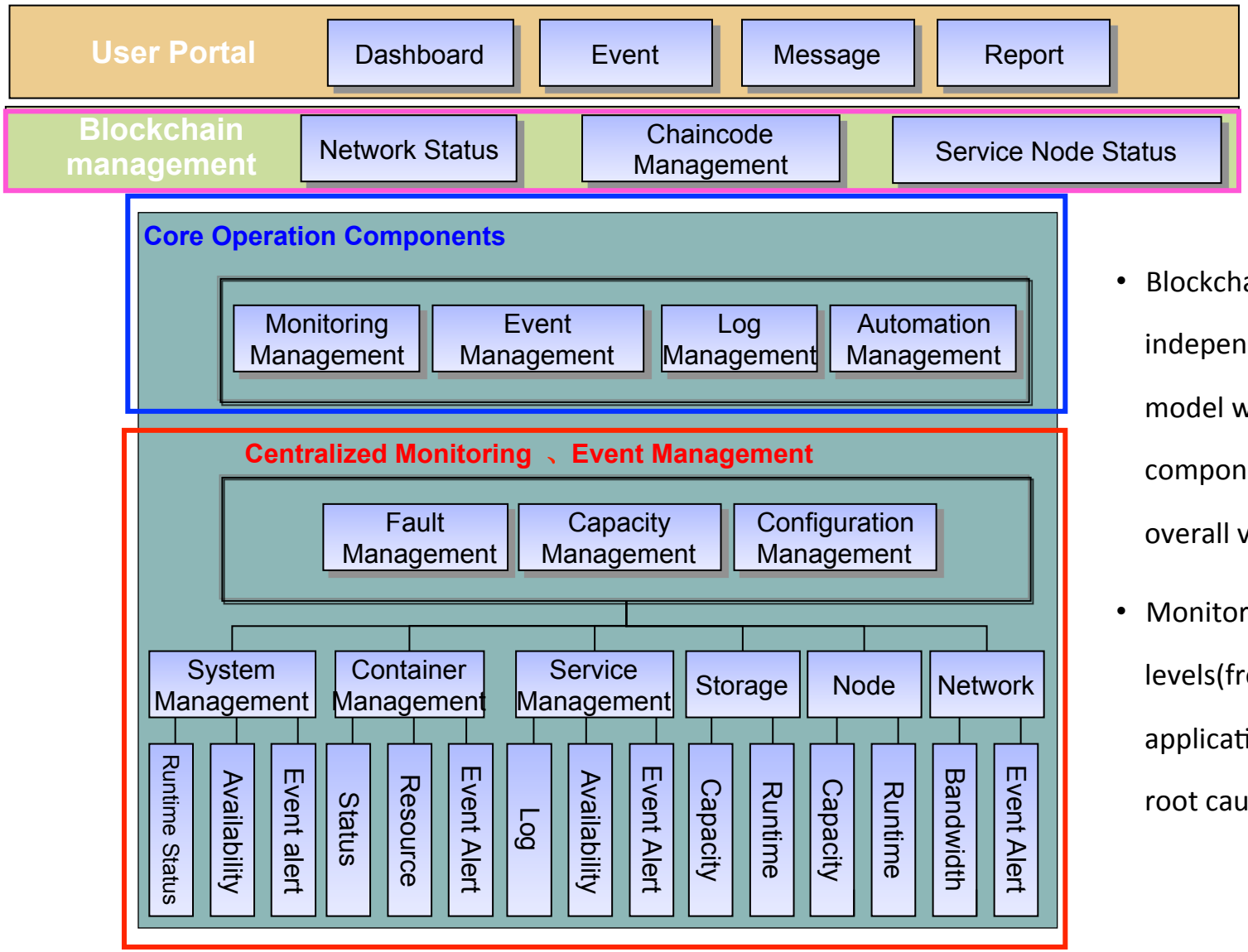
- PKI based member authentication, authorization and access control
- Logging & Audit support

- Distributed Ledger
- Encrypted Ledger
- Ledger Backup & Restore

- Communication Encryption among nodes
- Isolated core Blockchain network

- Multi Channel support for transaction privacy
- Transaction anonymity, but auditable

Complete Operation System to isolate IT Operation Complexity



- Blockchain platform has an independent operation model with corresponding components to support overall view
- Monitor IT issues at all levels(from platform to application) and identify root causes

Reference: Chinese famous commercial bank

Background:
The bank has lots of investment in Blockchain research and Hyperledger fabric application development. With more and more Blockchain application online, now they need a dedicated Blockchain platform to host all Blockchain application on it.

Solution:
IBM Blockchain as a Service deployed on IBM Microservice Cloud Platform(MSCP), which is based on Kubernetes technology. It provides the capability to quickly provision high available Blockchain network on demand to deploy and run blockchain application. It also provides powerful logging and monitoring functions by leveraging MSCP platform capabilities

Customer pains:
1. Lack of unified platform to support Blockchain application fast deployment with stable network and good performance
2. Blockchain network setup needs deep understanding on underlying technologies like network, storage, container and security…etc.

Benefits:
- **Greatly shorten landing cycle of Blockchain application**, leveraging BaaS to quickly setup Blockchain network, deploy Blockchain application
- **Customer only needs to focus on Blockchain scenarios and business models**, leveraging BaaS to isolate Blockchain technology complexity
- **Save development cost**, Lowering technical admittance threshold


Thank You