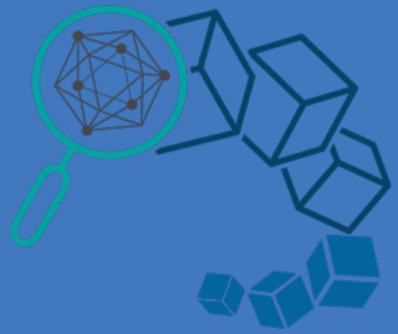
HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS



Hyperledger Fabric Chaincode Development

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About Me

- **Interested Areas**
  - Fintech, Cloud and Analytics
- **Technical Leader**
  - Senior Researcher/Architect in IBM, Oracle
- **Open-Source Contributor**
  - Hyperledger, OpenStack, OpenDaylight, etc.
- **Hyperledger Developer**
  - Core designer & committer of Fabric, Cello, sdk etc.
  - Hyperledger Technical Steering Committee (TSC) Member
  - Hyperledger Technical Working Group China Chair

Chaincode Concept

- Application logics to interact with the ledger
  - E.g., transfer money from account A to B
- Implement a Chaincode Interface
  - fabric/core/chaincode/shim/interface.go
- Running in containers at peer node typically
- Call Peer's API by a ChaincodeStubInterface
  - fabric/core/chaincode/shim/interface.go
- Stateless
- Deterministic

Chaincode Support

- Languages
  - Golang
  - Java

- How to call chaincode
  - CLI
  - SDK: Node, Python, Java, Golang

- Transaction: call chaincode functions

Chaincode Programming

- Implement the Chaincode interface

```
type Chaincode interface {
  // Init is called during Deploy transaction after the container has been
  // established, allowing the chaincode to initialize its internal data
  Init(stub ChaincodeStubInterface) pb.Response
  // Invoke is called for every Invoke transactions. The chaincode may change
  // its state variables
  Invoke(stub ChaincodeStubInterface) pb.Response
}
```

Demo Chaincode

```go
package main
import (
		"errors"
		"fmt"
		"github.com/hyperledger/fabric/core/chaincode/shim"
)
type DemoChaincode struct { }
func (t *DemoChaincode) Init(stub shim.ChaincodeStubInterface) pb.Response {
		// more logics using stub here
		return stub.Success(nil)
}

func (t *DemoChaincode) Invoke(stub shim.ChaincodeStubInterface) pb.Response
		// more logics using stub here
		return stub.Success(nil)

}

func main() {
		err := shim.Start(new(DemoChaincode))
		if err != nil {
				fmt.Printf("Error starting DemoChaincode: %s", err)
		}
}
```

ChaincodeStubInterface

- Ledger State Operations
  - GetState
  - GetStateByPartialCompositeKey
  - GetStateByRange
  - DelState
  - PutState
  - GetHistoryForKey
  - GetQueryResult

ChaincodeStubInterface

- Transaction Operations
  - GetBinding
  - GetCreator
  - GetSignedProposal
  - GetTransient
  - GetTxID
  - GetTxTimestamp

ChaincodeStubInterface

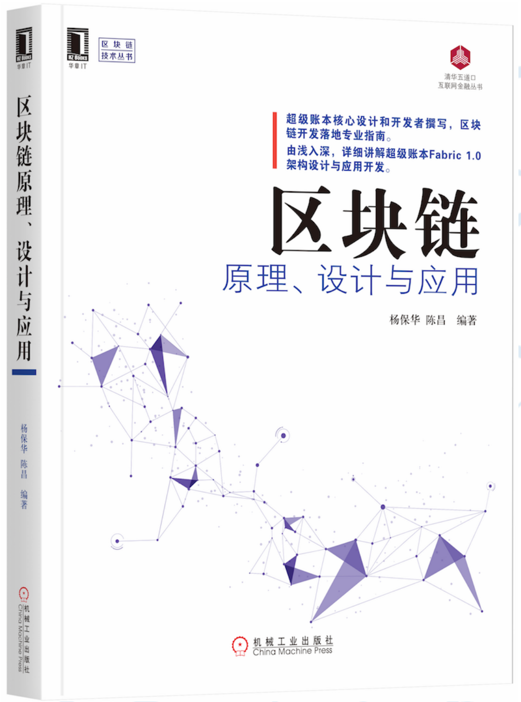
- Stub Arguments
  - GetArgs
  - GetArgsSlice
  - GetFunctionAndParameters
  - GetStringArgs

ChaincodeStubInterface

- Others
  - CreateCompositeKey
  - SplitCompositeKey
  - InvokeChaincode
  - SetEvent

Reference

- [Hyperledger Project]
- [Hyperledger Wiki]
- 《区块链原理设计与应用》
- 《Docker 技术入门与实战》
- github.com/yeasy/blockchain_guide
- github.com/yeasy/docker_practice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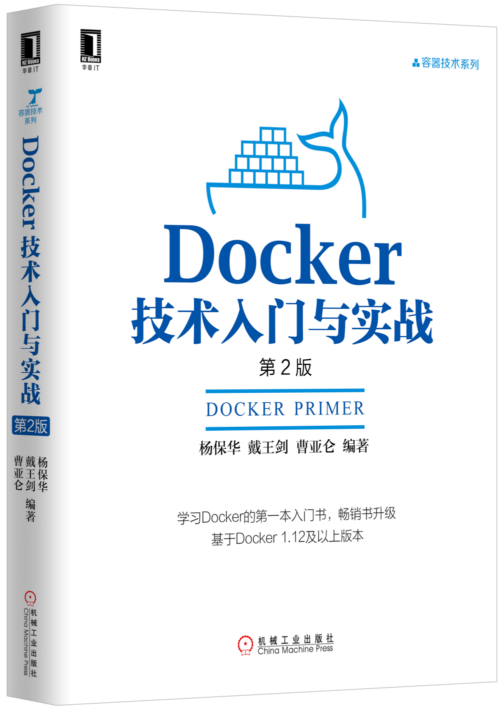
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Questions?

Thank You!
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Slides available at github.com/yeasy/seminar-talk#hyperledger