TECHNICAL DESCRIPTION

**Blockchain-based Solutions
(offline)**

Contents

1. Competition Name

Competition name: Blockchain-based Solutions

2. Technical Description

1) Description of the Competition

In the context of the BRICS initiative, this competition is designed around the development trend of blockchain technology and typical job skills in the application of blockchain technology in related industries.

The 2022 BRICS Skills Competition blockchain competition is designed according to actual project needs. In actual work, blockchain professionals need to be proficient in the following work skills:

1. Understand the major blockchain platforms, be able to use chain building tools to build blockchain network nodes, configure blockchain system parameters through configuration files, and be able to install blockchain middleware and other components for blockchain functions to expand.

2. Be able to use IDE for smart contract development, design the data structure of the contract according to the core logic of the business, distinguish between on-chain data and off-chain data, compile and deploy contracts correctly, and handle contract exceptions.

3. Be able to convert compiled contracts into familiar programming language file calls, develop related functions according to business requirements,

realize business process control in the backend, and display business functions through the front-end framework.

2) Basic Knowledge and Ability Requirements

1	Work organization, management	
	• Competitors need to know and understand: Solutions and practices that contribute to product sustainability. • Use available tools to solve problems and requirements. • Choosing the right option among multiple options, correct time estimation and allocation.	Theory
	• Competitors should be able to: Consider time limits and project deadlines. • Be able to debug and handle errors within the time limit. • Use computer equipment, servers and software. • Apply and search for new technologies and skills in accordance with industry developments. • Organize work schedules according to available time.	Practice
2	Engineering Documentation	
	According to the blockchain application requirements, write blockchain application design documents, requirements documents, etc.	Requirements
	• Competitors should be able to: Deeply understand the background and core requirements of the project. • Have good writing and presentation skills to write reasonable and readable documents. • Master the use of document writing tools, such as Word, Visio, etc.	Practice

3	**Blockchain System Operation and Maintenance**	
	According to the project requirements, install and deploy the blockchain system in the Linux operating system, install the blockchain middleware and other components, operate and maintain the blockchain system according to the blockchain application requirements, and configure the parameters of the blockchain system.	Requirements
	• Competitors should be able to: Use Linux operating system, master common shell commands, and be able to write simple shell scripts. • Download and deploy the FISCO BCOS blockchain system in Linux operating system. • Deploy single multi-node and multi-multi-node blockchain systems using the installation and deployment tools in the Linux operating system. • Monitor the operational status of the running FISCO BCOS blockchain system. • Deployment of WeBASE-Front middleware based on deployed FISCO BCOS blockchain nodes in the Linux operating system.	Practice
4	**Smart contract development**	
	According to the project requirements, use Solidity language for smart contract development, including storage, query, interface and other development to achieve the corresponding functions, and complete the compilation and deployment of the contract to the blockchain, to achieve the call access to the contract on the blockchain; send transactions to call the smart contract, and display the input and return content of the	Requirements

	transaction.	
	• Competitors should be able to: Use Soliidty smart contract programming language to deploy smart contract development in WeBASE-IDE. • Write storage contracts, interface contracts, and library contracts to meet the topic requirements. • Deploy smart contracts in WeBASE-IDE, call smart contracts, and test contract functionality to return results. • Export the bin file and abi file of the completed smart contract in WeBASE-IDE.	Practice
5	**Blockchain Application Development**	
	Based on Go WEB framework, build blockchain application system, write WEB application, receive user requests, call smart contracts in WEB backend using FISCO BCOS SDK, render pages, and display returned results.	Requirements
	• Competitors should be able to: Develop WEB applications using the Go Beego WEB framework. • Compile abi and bin files into go files using the FISCO BCOS Go SDK. • API Calling blockchain APIs using the FISCO BCOS Go SDK. • Call smart contracts using FISCO BCOS Go SDK.	Practice

3. Competition Events

This competition has a total of 600 minutes and includes five tasks, corresponding to the five competencies, that the contestants should have for the projects, listed in the second point of this document. The work and source code submitted by the contestants in each tasks should have the corresponding production specifications.

1) Competition Tasks

Modules	Tasks
Engineering Documentation	Create project documents such as design documents and requirement documents forthe system based on project requirements and implementation results.
Blockchain System Operation and Maintenance	In Linux operating system, build blockchain development platform, including blockchain system and blockchain middleware platform, etc. Based on specific requirements, verify availability and version information, etc., to ensure that the blockchain nodes are in normal running state, and make targeted configuration.
Smart Contract Development	According to the project requirements, use Solidity language for smart contract development, including storage, query, interface and other development to achieve the corresponding functions, and complete the contract compilation and deployment to the blockchain, to achieve the call access to the contract on the blockchain.
	Send a transaction to invoke the smart contract and display the input and return content of the transaction.
Blockchain Application	Based on Go WEB framework, build blockchain application system, write WEB application, receive user requests, call smart

		Duration	Score		Total
Development	contracts using FISCO BCOS Go SDK in WEB backend, render pages, and display returned results with complete query content and correct results.				
Professionalism	Follow competition rules and operation instructions.				

2) Competition Module

Modules	Module Name	Duration (min)	Score		Total
			Subjective	objective	
A	Engineering Documentation+ Blockchain System Operation and Maintenance	240	10	20	30
B	Smart contract development	180	0	40	40
C	Blockchain Application Development+ Professionalism	180	5	25	30
Total		**600**	**15**	**85**	**100**

3) Brief Description of the Mission

For example, a company plans to develop a "food traceability" application system to realize the traceability of food production, circulation and sales through blockchain technology, uploading and saving the information of food

production in factories, transportation through logistics and time and location in shopping malls or terminal sales, and generating "traceability code ". Consumers can use the "food traceability" platform to query food-related information after entering the "traceability code".

4) Brief Description of the Module

1、Engineering documentation

Create design documents and requirements documents for blockchain application according to the requirements.

2、Blockchain System Operation and Maintenance

Install and deploy blockchain system in Linux operating system, and install blockchain middleware and other components, operate and maintain the blockchain system according to the requirements, and configure blockchain system parameters.

3、Smart contract development

Use Solidity programming language to develop smart contract, including storage contract design and development, interface contract design and development, finally realize blockchain depository function, deploy the completed compiled smart contract in the blockchain system, and test the function of the completed deployed smart contract.

4、Blockchain Application Development

According to the provided programming language environment (Go), write the WEB application system, respond to user requests in the WEB application,

call smart contracts using FISCO BCOS Go SDK, and render the call results to the WEB page and return them to the user.

5、Professionalism

Operation specification, civilized competition.

4. Competition Team Requirements

This competition is an individual competition, where 16-35 years old can participate, regardless of gender. Each team can be facilitated with one expert.

5. Scoring Rules

The grading work of the competition will be conducted in a unified way by online video conference. All experts are graded in groups under the organization of the chief expert.

If a player cheats or violates other rules during the competition, the referee will deal with the violation according to the player's violation. If the circumstances are serious, the score will be cancelled.

1) Scoring Criteria Development Principles

The competition adopts the combination of process scoring and result scoring, as well as the combination of skill scoring and professionalism scoring to examine the comprehensive quality of the participants. At the same time, the scoring standards were formulated in accordance with the principles of "scientific rigor, objectivity and fairness".

1. The full score of the competition is 100 points.

2. In order to ensure the objectivity of the event judging, detailed scoring criteria are formulated for each set of competition questions, refining the scoring items, quantifying the scoring criteria of each scoring item as much as possible, reducing the proportion of subjective judgment, and ensuring the objectivity and fairness of the event.

2) Scoring Method

1. The competition will be graded by the scoring method of step-by-step scoring and accumulative total score. Scores are calculated separately between modules, and errors are not transmitted between modules.

2. Independent scoring principle. Before scoring, the referees will randomly draw lots into groups to prevent subjective team formation. Each referee group will score independently according to the competition module. After scoring, the total score will be counted to ensure that the score evaluation is objective, rigorous and accurate.

3. During the competition, if the contestants have uncivilized behaviors such as disrupting the order of the field, interfering with the normal work of the referee and invigilator, the chief referee will deduct the corresponding points of the special project. If the circumstances are serious, the competition qualification will be disqualified. Exit the game.

4. Contestants are not allowed to mark the results of the competition with the information of the participating team. If they are found, they will be disqualified from the award evaluation.

3) Scoring Rules

Module	Weight	Tasks
Engineering Documentation	10%	Prepare project documents such as design documents and requirement documents for the system based on project requirements and implementation results.
Blockchain System Operation and Maintenance	20%	In Linux operating system, build blockchain development platform, including blockchain system and blockchain middleware platform, etc., and verify availability and version information, etc., according to specific requirements to ensure that the blockchain nodes are in normal running state, and make targeted configuration according to requirements.
Smart contract development	25%	According to the project requirements, use Solidity language for smart contract development, including storage, query, interface and other development to achieve the corresponding functions, and complete the contract compilation and deployment to the blockchain, to achieve the call access to the

		contract on the blockchain.
	15%	Send a transaction to invoke the smart contract and display the input and return content of the transaction.
Blockchain Application Development	25%	Based on the code framework, build the blockchain application system, write the restful API, operate in the WEB page by interacting with the user, call the blockchain API in the WEB backend, and display the returned results with complete query content and correct results.
Professionalism	5%	Operation specification, civilized competition.

6. Materials and Equipment

1) Software list

The software and instructions to be installed on the competitor's computer are as follows:

Software	Description
Operating System	Windows 10
Intelligent training platform	Intelligent training platform
Document editing software	Microsoft Office

Google Chrome	V103+
Notepad++	V8.0+
Chinese pinyin input method	
7-zip	V21.07+
draw.io desktop version	17.0+

The software and instructions to be installed on the competition platform are as follows:

Operating System	Ubuntu 18.04 LTS
Blockchain underlying technology platform	FISCO BCOS V2.8.0
Blockchain management platform	WeBASE V1.5.4
Golang	1.17+
Java JDK	8+
Bee	2.0+
FISCO BCOS Go SDK	
Visual Studio Code	1.65+
Ms Office	2016+

2) Prohibited Materials and Eequipment

Any materials and equipment carried by the entrant should be declared (presented) to the expert. Experts may prohibit the use of any item that is

irrelevant to the performance of the mission or that may give a competitor an unfair advantage.