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China Cloud System Pioneer Strategic Alliance

Cloud computing strategic alliance technical standards

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The Technology Standards of Framework and Workflow of Cabin Computing System

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Preface

The "Framework and Process Technical Standards for Cabin Computing System" consists of the following 3 parts:

- Part 1: Terms and definitions;
- Part 2: The cabin computing system framework;
- Part 3: Workflow of cabin computing.

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed by Tongji University.

This standard is under the jurisdiction of the Information Technology Standardization Technical Committee (SAC/TC180).

The organization responsible for drafting this standard: Tongji University.

Participated in the drafting of this standard: Donghua University.

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Introduction

With the continuous development of information technology, the accumulated data of various applications has shown explosive growth. Correspondingly, in order to improve data processing capabilities, cloud computing and other providers have also invested a lot of manpower, material resources and financial resources to purchase various hardware equipment. In order to further improve the efficiency of resource use, cabin calculations have appeared. Cabin computing should be built flexibly in response to the needs of IT tasks, managed by expansion and contraction in response to the execution of IT tasks, and dynamically die out in response to the end of IT tasks. It includes the completion of the four functions of "recognizing requirements, resource allocation, task execution, and ending tasks" from the vertical dimension of the full life cycle of IT tasks. It can realize the overall configuration and coordinated operation of data resources and physical resources from the horizontal dimension of the resources required for IT tasks. In order to standardize the framework and calculation process of the cabin calculation system, technical standards for the cabin calculation framework and process are specially formulated to ensure the validity and standardization of the cabin calculation.



Technology Standards of Framework and Workflow of Cabin Computing System

1 Scope

This standard regulates the structure and workflow of the cabin calculation system, provides a unified name specification and definition description, and provides a reference for the preparation of other standards related to cabin calculation.

This standard applies to cabin computing related organizations and their products and systems designed, developed, issued, managed, and maintained, and provides reference specifications for the service platform of the industry.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document. For undated references, the latest version (including all amendments) applies to this document.

GB/T 1.1-2009 Standardization Guidelines

GB/T 32431-2015 Information Technology SOA Service Delivery Guarantee Specification

GB/T 32430-2015 Information Technology SOA Application Service Analysis and Design

GB 4943.1-2011 Information Technology Equipment Safety Part 1: General Requirements

GB/T 20988-2007 Information Security Technology Information System Disaster Recovery Specification

GB/T 22081-2008 Information Technology Security Technology Information Security Management Practical Rules

GB/T 22239-2008 Information Security Technology Basic Requirements for Information System Security Level Protection

3 Terms and definitions

Cabin computing

The cabin generation and management system: According to the needs of users, combined with the data resource distribution map provided by the virtual in-situ data center and the resource distribution map provided by the cross-domain resource management system, the cabin resource suggestion table is generated for the user, and according to the user's Request to submit a resource request.

Cross-domain resource management system: Register and collect available computing, storage, and network resources in the Internet, provide external query services for resource distribution, and resource application, monitoring, and cancellation services, and can manage and configure host mirroring and other software environments system.

Virtual in-situ data center: A data center that explores Internet data resources, generates and maintains Internet data resource distribution maps, and provides external data distribution query services.

Cabin Gateway: A platform that provides users with cabin application, monitoring and management in a distributed deployment environment.

4 Cabin computing system framework

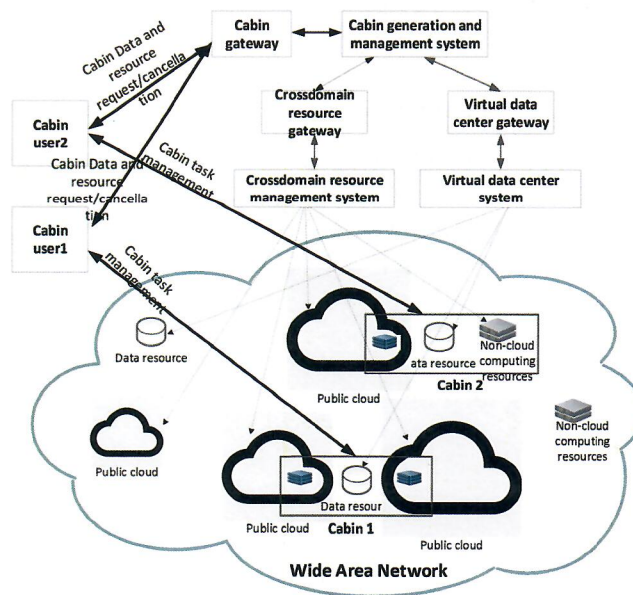


Figure 1: Architecture diagram of cabin system



The cabin computing system is mainly composed of a cabin gateway, a cabin generation and management system, a virtual data center gateway, a virtual data center system, a cross-domain resource gateway, and a cross-domain resource management system:

- (1) The cabin gateway is mainly composed of business gateway, identity authentication module, API monitoring, intelligent flow routing and current limiting module, user registration service and other modules. The service gateway is the unified access point for service requests, which can realize the functions of service-level flow control, service filtering, service aggregation and discovery; the identity authentication module realizes user registration, management and identity authentication; API monitoring realizes the access to external API services Monitoring; the current limiting module mainly realizes the restriction of business access traffic; intelligent routing realizes the routing of service access;
- (2) The cabin generation and management system consists of a user demand management module, a data distribution map acquisition module, a cross-domain resource catalog acquisition module, and a cross-domain resource scheduling module. The user demand management module accepts user demand information and describes the user's needs for computing tasks; the data distribution map acquisition module accesses the virtual data center, and obtains the data distribution from the data distribution map service according to the data demand provided by the user; cross-domain resource catalog The acquisition module accesses the cross-domain resource management system to obtain the cross-domain resource catalog; the cross-domain resource scheduling module uses the resource scheduling algorithm to calculate the resource requirements of the cabin according to the needs of users, the distribution of the acquired data, and the acquired cross-domain resource catalog List.
- (3) In addition to modules such as current limiting, identity authentication (optional), API monitoring, and intelligent routing, the virtual data center gateway also has internal service orchestration capabilities such as user registration and data resource distribution map services, which can realize rapid business services combination.
- (4) The virtual data center system is composed of modules such as network data explorer, exploration sample library, data resource distribution map manager, data resource



distribution map, and data resource distribution map service. The network data explorer explores the data of Internet big data and protocol data providers, generates a data resource distribution map, and puts the exploration samples into the exploration sample library; the exploration sample library saves the data obtained by the network data explorer during the exploration of the data Exploration samples; data resource distribution map manager maintains the data distribution map data, realizes the addition, deletion, modification and check of the distribution map; the data resource distribution map saves the description of the data and the data location information; the data resource distribution map service provides external data resource distribution maps Data access service.

- (5) In addition to modules such as current limiting, identity authentication (optional), API monitoring, and intelligent routing, the cross-domain resource gateway also has internal service orchestration capabilities such as user registration, computing resource distribution map service, and task request submission service, which can realize the quick composition of business services.
- (6) The cross-domain resource management system consists of resource registration services, resource status update modules, resource catalog managers, and cross-domain resource catalogs. The virtual computing resource center is composed of registration modules, resource management modules, and resource request management modules. Cross-domain resource catalogs Service, cabin resource request service and resource application/cancellation modules. The resource registration service provides the resource registration of the external resource provider on the platform; the resource status update module realizes the update of the resource status of the resource provider, the resource catalog manager manages the cross-domain resource catalog, and realizes the addition, deletion, modification and check of catalog data; cross-domain resource catalog It is a list of cross-domain resources; the cross-domain resource directory service provides external resource directory services; the cross-domain resource management system also provides a cabin resource request service for receiving resource requests from the cabin. After receiving a resource request list, the cabin resource application module will use the



application resource application interface to apply for resources from the resource provider according to the requirements in the resource list. When the resource application is successful, it will update the cross-domain resource catalog. At the same time, the successful application information is returned to the resource applicant; the resource application/cancellation module realizes the application and cancellation of resources according to the request of the cabin generation and management system.

5 Workflow of cabin computing system

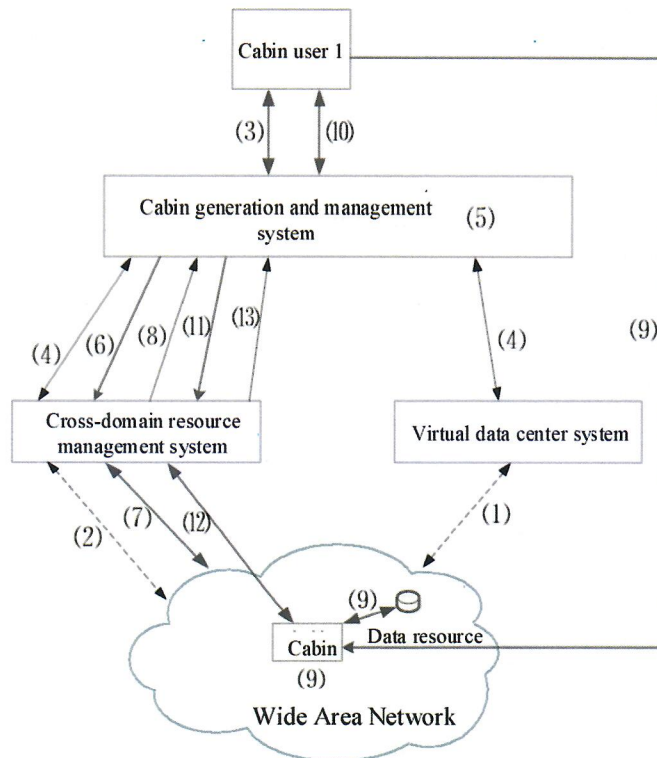


Figure 2: Work flow of cabin computing system

- (1) The virtual data center system is an independent public service system that runs 7*24 hours. There are two main sources of data in the virtual data center. One is open Internet data, and the other is a protocol data provider. The network data explorer uses exploration algorithms to explore two kinds of data resources and generate a data resource distribution map. The data resource distribution map mainly describes the characteristics of the geographic location, data resource type, data resource update



speed, and data resource amount of data resources. External applications can obtain required data resource information through the public services of the virtual data center;

- (2) The cross-domain resource management system is an independent public service system that runs 7*24 hours. The cross-domain resource management system provides a resource registration service. Any IT resource on the Internet can be registered through the registration system. The registration service requires the resource provider to provide information about the geographic location of the resource, resource description, resource acquisition method interface, resource usage tariff, and real-time resource status query interface. After Internet resources are registered, a resource directory will be formed. This catalog is regularly updated through the resource status update module;
- (3) When a user has a computing task, the user logs into the cabin generation and management system through the cabin gateway, and submits the task after passing the identity authentication. Requirements are divided into two categories. One is information related to computing tasks and constraints, mainly including computing task volume, data transmission and computing processing condition constraints, price constraints, etc. The other is to calculate data requirements (data types, keywords of data content, data volume requirements, system environment requirements, etc.) information;
- (4) After receiving the information submitted by the user, the cabin generation and management system requests the cross-domain resource management system for cross-domain resource catalog information through the cross-domain resource gateway, and at the same time obtains the required data resources from the virtual data center system through the virtual data center gateway Distribution map information;
- (5) The scheduling module in the cabin generation and management system combines the information obtained by the cross-domain resource catalog and the data resource distribution map according to the user's demand information to optimize the resource



- allocation and generate the resource demand list of the cabin;
- (6) The cabin generation and management system submits the generated resource requirement list to the cross-domain resource management system;
 - (7) The cabin resource request module of the cross-domain resource management system sends resource and environmental requests to the public cloud or non-cloud computing resources to which the resource belongs through the cabin resource application module according to the received resource demand list;
 - (8) After all resource and environmental requests are completed, the cross-domain resource management system returns the cabin resource application completion information to the cabin generation and management system (including the server IP of the cabin);
 - (9) After the cabin generation and management system receives the information that all the resources have been acquired, the user can log in to the requested resources to build the cabin computing environment, deploy computing tasks, and also access data resources;
 - (10) After completing the calculation tasks of the cabin, cabin users can close the generated cabin through the cabin generation and management system. Once the user decides to cancel the cabin, the cabin generation and management system will submit a request for the cancellation of cabin resources to the cross-domain resource management system;
 - (11) The cross-domain resource management system returns all the resources applied for by the corresponding cabins to the resource providers to complete the cancellation of cabin resources;
 - (12) After all resources are cancelled, the cross-domain resource management system returns the information that the cancellation is completed to the cabin generation and management system.

6 The deployment method of the cabin computing system

The cabin computing system can be deployed in two ways: centralized and autonomous. The main difference between centralized deployment and autonomous deployment is whether to use a centralized cabin generation and management system. Figure 1 shows a centralized deployment. The cabin generation and management system is a public service. All users use the centralized cabin generation and management system to generate, monitor and manage cabins. The cabin computing system can also be deployed autonomously. Each user uses the cabin generation and management system to directly coordinate with the virtual in-situ data center and cross-domain resource management system to realize cabin computing.

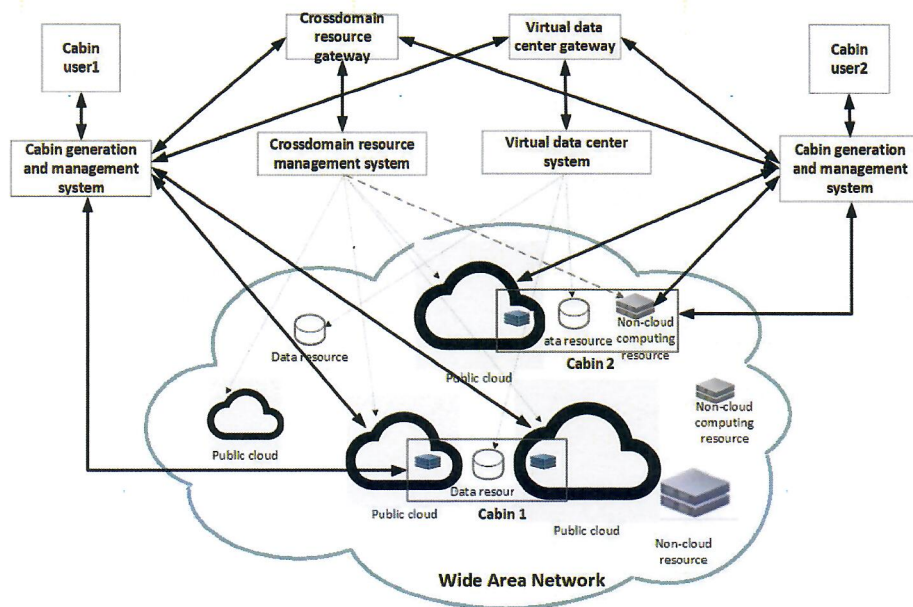


Figure 3 The cabin computing system deployed autonomously



References

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