The Fog Computing Attemper Layer Model Based on Agent Role

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Abstract. In this paper, a new role task scheduling method based on behavior flow is proposed for fog computing system. Because the traditional computing has changed from data oriented to edge oriented and distributed computing, the task scheduling method combines the role collaboration behavior and role Organization definition behavior in resource nodes by establishing the role behavior flow system, and establishes the role behavior flow mode from the center to the edge, so that the computing nodes can advance according to the behavior roles of their respective nodes Line classification processing. Therefore, it can effectively solve the problems of slow service response, high power consumption and frequent task interruption caused by large amount of data and redundant operations in traditional cloud computing systems.

1. Introduction

The purpose of fog computing is to distribute data and computing to the edge, and solve the network bandwidth pressure and data center burden brought by traditional cloud computing [1]. Fog computing is based on the way of center independence. It proposes a lightweight distributed service architecture, which can be accessed through the interface agent. This distributed service architecture of microservices can meet the edge computing services required by the caller's application, and complete the corresponding tasks [2]. The whole edge computing can be regarded as a gyroscopic computing system. In the gyro computing system, a large number of resource business applications are solved by sharing the resources of all kinds of edge nodes. The scheduling efficiency of fog computing workflow is the most important part of the system, and edge computing is conducive to the rapid and efficient access to all kinds of service resources [3].

The method of workflow call is applied to different fog computing architecture. Through the design of large amount of work, the efficient workflow assignment of fog computing can be realized by the different environment and dispersion of data similar to that in gyro computing [5]. In general, the problem of efficient workflow management and service decomposition in fog computing environment needs further analysis and research. At present, a large number of researches at home and abroad mainly focus on the system algorithm of workflow, while few researches on the execution time feature extraction of node workflow distributed response time [6]. Pan foster and Barl tesse found that in the complex environment of multi-level dynamic change and multi structure and multi task, it is a key problem to achieve flexible sharing of various resources through workflow decomposition and allocation. Through the use of flexible and powerful workflow allocation model, effective system
construction of computing resources requires flexible fog computing algorithm model. The efficient operation of fog computing task depends on whether the computing platform can establish the relationship between user requirements and tasks according to various links in the workflow through the designed algorithm model, so that the task can realize the automatic control of a series of processes from resource discovery task decomposition task operation [8]. In the fog computing system, a large number of operation node resources are distributed in the node terminals, and a series of efficient algorithms are needed to simplify a large number of operation applications. The function of task scheduling is also the key point of affecting the efficiency of fog computing. The effective solution of the workflow decomposition problem of fog computing can make the application task complete the node work faster and efficiently [9]. The workflow scheduling task in fog computing can ensure the application task to achieve high quality and complete service implementation and through resources, and ensure the utilization of resources is higher. In the work of fog computing system, the resource information point is in a state of low utilization most of the time. A study conducted by the University of new Virginia shows that even in the most idle time, nearly 30% of its nodes are busy, and a large number of them can be used on average. A small number of these idle nodes are caused by the temporary absence of resource owners or various reasons. Although different systems have different definitions of "different use states of nodes", one thing is certain, that is, if the node load is high, it will not be able to undertake more workflow tasks. The main effective optimization scheduling resource task model can improve the efficiency of the use of node resources, at the same time, make the service information flow load of resources low, so as to ensure that the service use most of the time in the low load computing state [10]. This will bring more computing benefits to task owners.

In view of the above description, based on the above reasons, this paper proposes a new role task scheduling method based on behavior flow applied to fog computing system. In this method, a multi-agent role interactive connection mechanism is established, so that a large number of information resources can be divided into several hierarchical models according to the task function of the computing node [11]. In order to establish the whole task workflow system, each agent role in the system is divided into the bottom layer, middle layer and high layer. In each given role task layer, the multi role agent integration is used to realize the sub role collaborative work and share the resources of edge nodes to map the given level resources in the parent system. At the same time, within the method model, all the functions of the edge nodes can be completed depending on the cooperation among the roles [12]. All kinds of agent roles among algorithms can achieve the function of rapid evolution through fast iterative and hierarchical interaction. This architecture can be used to solve the large-scale parallel and multitask simultaneous processing problems of multi node and complex redundant tasks, and further solve the large-scale discrete problem in high latitude space and physical space. When the problem scale reaches a certain level, the structure of the angular task model of the algorithm does not need to change the corresponding analysis of the hierarchical role model, which is also built in this paper. The relevant experimental environment is set up for testing and demonstration.

2.Role Object Resource Model Theory

2.1.Basic Concept of Role Object Resource
Role object is the abstract structure of resource receiving process, resource processing and resource sending task. In the definition of role object resource model, role object resource is a uniform role responsibility weight. The weight value defines the behavior mode and restriction of the resource of the role object. In other words, the role object resources are aggregated through the actions of resource object attributes, patterns, behaviors, capabilities, etc., through the centralized reflection of the members' purposes, energy efficiency, responsibilities, permits, limitations, methods, etc., and through the standardized definition of things classification. Referring to the relationship between users and the association mode of role objects, the establishment of role object joint cooperation activities is completed by the members. The definition of role object resource is to simulate the decomposition of role object according to the efficiency and ability of members. Through the participation of more role objects, multiple users can have different role objects. Role object is a relatively independent abstract unit, which has a certain purpose in the process of cooperation and can complete a set of operation unit
activities in sequence. Role objects are composed of activities, resources and states, and tasks in which activities play the role of role participants. Role object resource is the relationship between role and information. Role object has various conditions of role activity, among which all kinds of information materials required by role activity need to form event premise. The event is triggered by the role object activity. By changing the status of the role activity, the role object can be realized by the role object relationship in different states, resulting in the role relationship and the role object task relationship.

2.2. Association of Role Objects

Features of character objects

(1) Behavior objects of the same role object can share the same plan and execution. Taking a fog computing system as an example, for example, a resource role object node has a unified information structure, which can have the information and resources of the role object set at the same time.

(2) Resource collection and processing of role object behavior. For example, when dealing with multimodal task data, we can define a role object to deal with working resources. When the mapping of resource object structure is completed, the authorization is completed through the task category of the authorization role object.

(3) Role objects can be collected and shared uniformly.

(4) The actor of role object represents the specific process model of role object. For example, the roles of different resource categories of edge calculation nodes reflect different control scope and capabilities of nodes.

(5) The behavior of role objects is controlled by the access of special object interfaces. For example, if an edge computing node is regarded as the computing role of the parent node object, its work is the upper level computing and capability processing, and its task group is the computing task group of the parent node. Other related tasks are not accessible.

3. Realize Role Agent Processing by Establishing Role Object Level

3.1. Role Object Agent Task Level Description Model

The traditional resource level processing method in fog computing has a great influence on the task processing efficiency of edge computing system. Through the agent role task processing process, the traditional hierarchical processing task is regarded as an orderly combination of a series of logic related activities, and the simple processing of complex model is realized through a simple processing goal.

By relying on the interaction between agents in multi-role multi-agent system to deepen the role processing model, the multi-layer role is divided into function, according to the level according to the type. Through the hierarchical structure of the single level agent subsystem, from the bottom to the top, the multiple iterations of the role agent subsystem are realized to realize the decomposition and layering. As shown in Figure 1. By receiving the generation system function of its parent, the sub agent realizes multi role collaborative organization work through multi role iteration. And through the role of multi-level agent iteration to achieve the internal role agent to complete the relevant
organizational capabilities. In order to realize the rapid transformation, agents in the agent organization can contact each other. We need this structure to adapt to emergencies, especially to solve a large number of conflict problems. In order to achieve the quality dispersion of the physical space of the role node and the range separation of the multi-dimensional space, the model of the hierarchical structure can be changed automatically by increasing the scale of the problem. Generally speaking, the establishment of hierarchical multi role task processing model can also deal with various resources in practical application. Its basic functions are as follows:

1) By distributing the functions of role objects into a unified body, the relationship between activities is demonstrated, and the role decomposition of interaction operation of role subjects is increased. Therefore, through the unified description of the method, the simple practicability of the activity can be determined.

2) By abstracting all kinds of agents in fog computing system as role objects, the relationship between task processing and task interaction is abstracted when role objects decompose tasks by multi-agent method. By involving all kinds of agent objects in the role model, the task activity becomes necessary and ensures that the role activity task is always in a dynamic description state. Through the role-oriented object interaction process, the automatic interaction and processing of role objects are realized. The role agent object sets the performance of the object computing body by perceiving the role environment, and can perform independent operation of different edge computing on behalf of the agent, so as to achieve the purpose of aggregation computing. It makes the role computing object have traffic, independence and identity. The role proxy model has this property.

3) Role object is the most important environmental indicator in role task processing. Through role transformation, the whole process of task processing can be changed. Through the constant changes of role objects, the environment framework is constantly changing. Through the dynamic processing of role objects, the flexibility of role objects is improved, and the hierarchical processing efficiency of role objects is improved. And the multi-agent role object model has many problems, such as the structure range is not wide, the universality is poor, the identity is insufficient, and the scene problem can be dealt with in time. Through the interaction analysis with different role objects. Multi agent role method can be established as a method based on large quantity, automatic control, mapping and hierarchy.

3.2 Hierarchical Dynamic Role Object Task Processing

In gyro computing system, it is not easy to find a dynamic workflow processing method, but the role automatic hierarchical dynamic strategy can be an efficient solution. Because the common methods are based on heterogeneous conditions, the automatic loading of machines can not achieve self-management or even self balance. And the real problem of the general heterogeneous platform task dynamic strategy is that it can't rely on the object level, because this processing may lead to the slowest computing speed to the slowest processing workflow inefficiency. Therefore, through the analysis of the heterogeneous platform of fog computing system, this paper proposes a hierarchical model processing scheme for the dynamic static combination of multi task roles. How to identify the reflection amount and calculation mode of themodal data of multiple static terms for each calculation not only solves the problem of information resource decomposition of multiprocessor. Through the work processing mode applied to task flow, the role resource can be effectively controlled by role agent. Typically, when a role resource reaches a critical point, the agent stops distributing the resource to the role by stopping. Therefore, the efficiency of resource information should be considered in resource decomposition, as well as the interaction and mapping between multiple role resource objects.

Hierarchical role object is not only an object level term, it corresponds to the granularity and granularity of task decomposition. According to the scope combination of task process, it can be reduced to a human thread
By setting up a single fog computing processing resource, service role agent management can guarantee the collaborative processing of role objects through the process of intelligent decision-making and reasoning agent triggered by the message of objects, uncertain role object environment with current execution conditions, trigger role object management by determining the next round of execution role state, and transfer objects by naming roles. Role object management determines the next execution entity and merges the resource list of the collected role object. Through the feedback of role object and next executive role to role task management agent point, role task management agent becomes role executive entity user, and role entity information is fed back to multi-agent node, and corresponding role information provider is proposed. By building the user as the execution entity, the role object will provide the operation interface and necessary combination services, and the whole role target decomposition and execution will be completed by the role entity together. Through the role implementation of entity interaction, to ensure the role implementation and completion of tasks, in order to achieve different tasks. Through role user extraction, data collection and feedback to role agent.

Fog computing role service process can be regarded as a workflow. In general, its workflow includes the high level of abstract roles. The purpose of role service of the whole fog computing system is to run through some core role flows. From the internal system point of view, each process of the fog calculation node of the same role can be completed. There is a preposition between subsequent relationship processes. For example, taking multitask as an example, task flow includes three sub processes: multidimensional creation of interaction region, visual interaction region connecting model, multitask processing and scene rendering. Different role states are completed by existing tasks of the service relationship. Different roles contain different processes. The fog computing nodes of corresponding roles assign different process tasks according to the requests submitted by different users. The form of agency consists of nodes and roles, and the cooperative relationship is shared by them. To sum up, the role of role object relationship is uncertain, and the most effective way to achieve the ultimate goal and essence of workflow is through the process node chain.

4. Analysis Experiment
Through the use of 20 computers to carry out role object level workflow fog computing experiment, multi task model work test and multi task buffer model test. The verification environment is in a single network environment. The above models are tested and compared many times.

1. Analysis of workflow twist rate

(a) File conversion rate buffer display 
(b) Conversion rate of hierarchical role workflow mode

Figure 3. Comparative analysis of file conversion rate between two scheduling models
The higher the twist rate of workflow is, the higher the error rate of the file converted by task scheduling in fog computing is (the more obvious the twist rate is, the file has been converted in place, no additional twist is needed). As can be seen from Figure 4, the transformation rate of the algorithm model proposed in this paper is relatively low, and that of other algorithms is basically the same as that of time.

5. Conclusion
The role task scheduling model proposed in this paper establishes the mapping transformation between information and tasks. This shows that this is not only a task flow allocation of edge computing, but also the primary purpose of improving the efficiency of resource allocation. For the role level assignment of multi-agent workflow, the role object task decomposition mechanism can make the task load fluctuate to meet the needs of task decomposition. It doesn't need to do it according to its other capabilities. Finally, the algorithm solves the balance between users and role objects. The analysis and experiment show that it has a great advantage in role task processing mode. By establishing the number of all kinds of experimental nodes, further experiments can be carried out by increasing the number of nodes. Finally, efficiency will be tested by simulating a specific large data environment.

6. References
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