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FAULT TOLERANCE AGENTS IN GRID ENVIRONMENT

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Abstract: Since fault tolerance becomes complex due to the availability of resources in decentralized grid environment, fault tolerance can be used in connection with replication in data grid environments. The objective of our work is to propose fault tolerance in computational environment with objects replication technique, In order to reduce or neutralize replica related faults. In our model agents work as replicas and Objects. The Analytical review shows that reliability towards replica, objects usage in Fault tolerance.

Keywords: Agent, Replication, Objects, Data grid.

I. INTRODUCTION

Grid [2] is a basic infrastructure of national high performance computing and Information services, it achieves the integration and interconnection of many types of high performance Computers, Data servers, large-scale storage systems which are Distributed and heterogeneous, and the important application research queries which are lack of effective research approach. Distributed hash tables (DHTs) and other structured overlay networks were developed to give an efficient key based addressing of nodes in volatile environments [1](i.e. distributed nodes that may join, leave or crash at any time).Due to these, two challenges arise in such environments:(a).When a node crashes , all data stored on this node is lost, But it can be addressed by data replication.(b).The node is suspected to be crashed, lookup inconsistencies may occur as a result of that wrong query results or loss of update requests may occur, the second issue can only be relieved but not overcome: It was shown in asynchronous network[3].

The rest of the paper is organized as follows. In section 2, we present some strategies related to replication in grid environments. Section 3 describes the reliability analysis model. Finally, we conclude our strategy in section 4.

II. RELATED WORK

Data grid [4] provides services for supporting the discovery of resources and enables computing in heterogeneous storage resource by storage of resource agent. Data consistency cannot be achieved if responsibility consistency violated [3] (i.e. when a node is suspected to be crashed, which lead to loss of update requests or wrong query results).As shown in[6]the probability of inconsistent data accesses can be reduced by increasing the replication degree and performing reads on a majority of replicas. In order to ensure data availability when nodes join, leave or crash at any time, the Data consistency is enforced by performing all data operations on a majority of replicas [7]. Replication in distributed is a practical and effective method to achieve efficient and fault tolerant data access in grids [8-10].Replica utilization in fault tolerance strategy is challenging research in data grid. By placing multiple replicas at different locations, replica management [5] can reduces network delay and bandwidth consuming of remote data access. Issues with Replication are widely studied in Grid. Our Proposed Agents replica model mainly shows that the optimized Fault tolerance model.

III. PROPOSED WORK

The fault tolerance system proposed in this section has been to provide reliable model for replication in grid environments, if Agents become failed then adjacent agent performs its fault recovery operations with help of catalogue mapping.

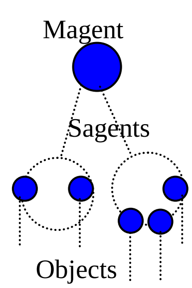

Figure.1.Replicas Initial Stage

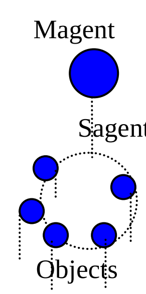

Figure.2.Replicas when Sagent fails

Sagents: The role of agents is storing local replicas of the currently registered distributed objects.

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Magents: They also act as replicas and contain local copies, there by subset of Agents becomes under the control of Magents, in the proposed model we consider that we have numbers of Magents are equivalent of classes. Sagents are having length of class i.e. Number of objects supporting in it.

A. Fault tolerance management

The agents are considered as replicas, it contains objects to identify particular replica or same replica with different request will be treated as object with different state clients.Inorder to identify particular object failed or not it requires log B steps, where B represents number of objects currently possessed by an agents.

The client initiates the update or search operations.(1).The Magent discover that particular Sagent is not active in the system(i.e. agent failed), then the Magent which is incharge of its Sagent performs object reallocation to adjacent sagent using inheritance technique.(2).If Magent fails, one of the Magent connected Sagent converted into Magent.

Agents size x,is a decisive factor and depends upon the resource failure rate and replicas request on objects.Inorder to provide reliable grid service, the fault tolerance model must satisfy minimum level of performance for job execution with replication. Failure/success rates of agents are measured, then reliability $M(b) = 1-(1-e^{-\lambda b})^{x}$ of a resource or replicas at objects b is the probability of the survival of replicas up to number of objects b.

In the fault tolerance model x agents are treated as replicas, then service of success rates are measured with varying values of the agents 'x'.Therefore using different agents(replicas) 'x' values, increasing values of objects b, The reliability of fault tolerance model is measured with mean failure rate λ= 0.007. From the table1 variables q,p are failure and success rate of faulttolerane model with increasing rate of agents(x).If Magent fails, then one of the connected sagent converted into magent,as result of that size of agents (x value) increases. By assuming q=0.4, p=0.6 the success Probability rate $p(x) = q^{x-1}p$, at agent(x=2) is good.

TABLE I
PERCENTAGE OF SUCCESS RATE WITH AGENTS SIZE

Percentage of Failure/Success		Agents (x) 2	3	4	5	6
q=40	p=60	0.24	0.0965	0.0384	0.01536	0.00614
q=60	P=40	0.24	0.144	0.0864	0.0518	0.0311

As is observed from table.1, the values q, p indicates failure and success of total agents in fault tolerance model. For example, from the values of q=0.4, p=0.6 we observed that only 24% of operations are success with number of agents x=2. From the first row of the table-1, probability of success rate decreases with increasing values of the agents size(x), as result of that failure rates of the sagents are also increases.Figure.3, presents the observed results graphically.

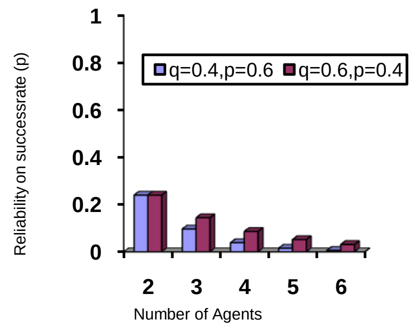

Figure. 3. Number of agents with Failure (q)/Success (p) reliability.

From the table.1, reliability depends on success rate of agents with different agents sizes (i.e. if number of Magents failure less than the success rates are high).In order to reduce failures rate we use fewer replicas with more objects).

TABLE III
RELIABILITY OF AGENTS WITH OBJECTS

Agents size(x)	Objects (b) with replicas 50	100	150	200	250
3	0.974	0.872	0.725	0.572	0.436
5	0.997	0.967	0.883	0.757	0.615
7	0.999	0.991	0.950	0.862	0.737

By considering the mean failure rate of replicas in group as λ= 0.007, the objects increases with varying agents size, the table.2 shows that results of reliability with varying objects.

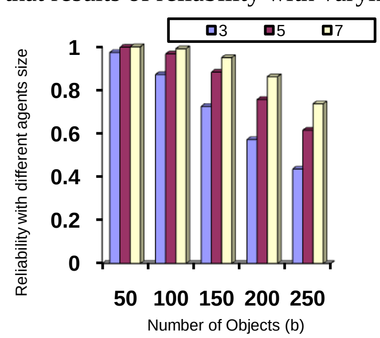

Figure.4. Reliability of agents with objects size increases.

From the figure.4. Legend axis values 3, 5, 7 are agents size. In the specified model, if fault occurs the object states can handle faults instead of agents. Due to using of objects in Replication technique the reliability factor increases when compared to agents.

IV. CONCLUSION

This paper addresses the theoretical results through the proposed agents fault tolerance model, this model supports for large scale distributed monitoring system. Our goal was

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to invest the system with adequate number of replicas in the presence of failures. We shown that an optimistic fault tolerance replication model. In this work the proposed model reliability achieved with help of data redundancy technique used in the inter-SE (storage element) and intra-SE.The next step will consist implementation of the proposed model using simulation

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