International Conference on Computational Modeling and Security (CMS 2016)

Automatic Fault Tolerant Software System for Desktop Grid Middleware

Rajesh kumar¹*, Surender Jangra²

¹Ph.d Research Scholor, JJT university, Jhunjhunu, 333001, India
²Assistant Professor, GTB Collage, Bhawanigarh, 148026, India

Abstract

Fault tolerance is a crucial constituent for research in desktop grid. The focus of this research paper will be on development of Fault tolerant software system taking care of computational power. Resources of Alchemi grid necessitate for assemble available computational power in grid. The Alchemi desktop grid is important middleware for gather computational power by executors on different nodes. Executor related faults and failures can stop running grid any time. Executor flaws are exceptionally crucial in Alchemi desktop grid middleware. The Available computational power is dependent on the number of executors. Alchemi Grid provides manual procedure for control on executors. The middleware has not integrated automatic system to control execution level deficiencies. This issue has not been addressed in Alchemi desktop middleware. Today, we need an automatic software technique for reliable and consistent working of computational grid. This Research work has projected, designed and developed automatic software system to control the executor faults in Alchemi middleware. Normal and defective executor nodes can be distinguished by regular monitoring software system. Automatic software system is helpful for monitoring and controlling the executor faults in Alchemi middleware. Executor can start and stop by automated system in milliseconds. Control on executor will put impact on available computational power in grid. Proposed automated software system has skilled to sense faulty executor node and correct the fault by start process on best Available node. Automated framework is capable to remove fault in executor node. Regular monitor system has used for the development of automated fault tolerant software system. The Best available node can be selected on the basis of memory usage or processing power usage on remote node.

* Corresponding author. Tel.9779074073;
E-mail address: rajeshkengg@gmail.com

Keywords: Computational, Fault, Tolerant, Alchemi, Middleware, Desktop, Grid
1. Introduction to Grid computing

Computing force of a particular machine is not acceptable for composite problems. To handle these problems, there is need of approach, which has capacity to work on existing infrastructure. Computational grid (Alchemi.net) has based on the manager node. It acknowledges the computational jobs and circulates it in between executor nodes for result. At the point, when associate computational grid to an electrical grid, the grid is semi general and every client demonstrate a part to perform as cogenerater [1]. Ease of use of resources during faults is very important. Automatic fault tolerant frameworks are urgent need of time. Automated fault tolerant method will bring up the resource convenience during fault in executors. Alchemi desktop middleware consists of manager and different Executors. This environment is suitable for local area network and web [2]. Alchemi.net middleware has implemented on top of Microsoft .NET framework. Alchemi offers the runtime machinery for construct and managing desktop grids. An arrangement of thousand PCs can execute applications that further can execute on quick and expensive supercomputer [3].In terms of spending plan, super computer is very expensive. It is not promising for each social to purchase the supercomputer. Desktop grid can relate to virtual supercomputer, where incredible power can accumulate on specific machine. Machines related to applications in the system, with availability of more processor, which can give the speedier Outcome [3]. Lots of resources with tremendous ability are accessible in Institutes, colleges, government, Private (associations).Computational power should accessible in controlled manner from the available resources during faults and failure in desktop grid middleware.

2. Related work

Azeez et al(2011) says in research paper grid computing with alchemi middlewares permit submission of requests to execute a Job to Grid, It can run anywhere on the network. Therefore, grid Middlewares serve up as an mediator layer that consent to a consistent and standardized right to use to resources managed in the neighborhood with diverse syntax and access methods.In context of ease of access of various Middleware for Grid implementation with dissimilar features, Research paper focuses on a variety of features that are irregular to Alchemi by taking into concern its Architecture, the Operating system, software demand and restriction that are inborn from its practice.

Chopra (2006) says in master Research work concept of backup manager. Backup manager is based on the heart beating method as well as replication. It is based on fault tolerant method to watch the central Point failure. Crash of the central manager, control will take by back up manager. Grid can start again after failure due to central point. This research work does not provide any solution for execution node failure or any automatic solution.

Fulop (2008) say in research paper that composite computational and visualization algorithms need huge quantity of computational processing power. The computing force of a particular computer is unsatisfactory for execution of such difficult programmes. Usually, Big parallel supercomputers or devoted clusters were used for these types of jobs. A further suitable solution, which is appropriate for grid, is based on the utilization of desktop PCs in a Desktop Grid Computing surroundings.

Das and Sarkar (2012) say in research work in fault tolerance resources in computational grid that a variety of diverse assets of different managerial area are virtually dispersed by
dissimilar network in computational grids. So any type of failure can take place at any position of time and job execution in grid can fail. Therefore fault tolerance is an essential and demanding problem in grid computing. Dependability of each grid resource cannot be guaranteed. To create computational grids further efficient and consistent fault tolerant arrangement is compulsory. The objective of this research paper is to assess dissimilar obtainable fault tolerance methods valid in grid computing. This paper presents a state of art in a variety of fault tolerance methods and relative study of current programmes.

Latchoumy and Khader(2011) says in research work survey of fault tolerance of grid computing, the chance of a breakdown is larger than in conventional parallel computing. hence, the error tolerance is an significant property in classify to attain consistency, accessibility and QOS. This Research work,give a survey of diverse fault tolerance methods, fault administration in dissimilar systems and correlated problems. A fault tolerance examination linked with a variety of failure of resources. It includes process crash, processor breakdown and network fail. The survey gives the interconnected research outcome for fault tolerance in separate functional areas of grid infra-structure and provide the future instructions about fault tolerance methods. This paper is good reference for researchers.

2. Problem Definition

Alchemi middleware demonstrates a vast part in enclosure of desktop computational grid. Alchemi is .net based structure, which is helpful to construct the desktop grid in window environment. Alchemi desktop grid is made by positioning a manager and executers to affix with supervisor [4]. Alchemi middleware grants for asset devouring and asset designation for execution of jobs on various executing nodes. Alchemi is open source middleware, which can accumulate available power in the grid. Fault can happen anytime in running grid. Running jobs can stop anytime due to fault in executor node. Adaptation to internal failure is a huge and motivating issue that reliance on independently network asset is not ensured [5]. Executor fault can make troubles in running application. It will specifically impact on accessible force of desktop grid middleware. This Research emphasis on the shortcomings of executor machines in desktop grid. Heart beat method is elementary part to assemble grid framework for more unwavering quality [6]. This research work had concentrated to manage the computational power in short time. Adaptation to internal failure strategy comprises of finding of shortcomings in grid assets and offers recuperation to permit calculations [7]. This Research work has outlined and built up a automated system. It will control the computational force by sense and correct the fault in executor. Proposed system has developed on basis of regular monitoring system. Executor Fault can be detected and evacuated by the proposed system. Flaws and failure are the general basic issue in the grid [5]. Human efforts will be replaced by the proposed automated system. Proposed automated software framework can perform in milliseconds for discover and correction of executor fault. It will impact on the computational power in running grid [8]. Graphical client interface has developed to monitor the executor status in running grid. Computational Power in desktop grid is critical part for capability of framework in execution of any modified or application [9]. Testing of the Framework has performed in alchemi desktop grid middleware in local area network.
4. Proposed Automated software system for executor faults and computational power

Graphical user interface of automated system has developed for check the live status of executors in running Alchemi grid middleware. Central Point failure has addressed in past research [10]. This Research work has proposed and developed automated software Framework to recognize and correct the fault in executer nodes. It is capable to keep up the level of computational power in alchemi grid. Proposed framework has produced on premise of the accompanying steps.

- Code for right to utilize the process in remote machines.
- Code to affirm the present position of execution procedure.
- Code for find current status of executer machine. (Thirty seconds for find the status of executor).
- Code for consequently detect the faulty executer node.
- Code for correct fault (In milliseconds).
- Code for find the status of nodes based on current memory and processing power usage.

5. Results of Proposed Automated software system

<table>
<thead>
<tr>
<th>S.no</th>
<th>Distance Between nodes (In Meters)</th>
<th>Time (in milliseconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>87</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>53</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>62</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>64</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>49</td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td>55</td>
</tr>
</tbody>
</table>

In composite nature of grid computing, when the deficiency happens, it ought to handle as quickly as time permits. Figure out where the flaw survive and correct it without affecting [11]. Figure 1 is showing screen shot of software framework for discovery and correction of execution faults in alchemi desktop grid middleware. Graphical user interface is showing the
two machines in alchemi middleware. Green sign indicates for correct conduct of executor node. Red sign gives indication for fault in executor node in alchemi desktop middleware. Programmed revive system will show the state of execution processes in thirty seconds in alchemi middleware. Proposed framework has given support for refinement of defective Processes. Executor on remote system can initiate without human mediation in parts of seconds. This system is steady for manage accessible computational force in alchemi desktop Grid middleware.

Fig.1. Graphical user interface of proposed automatic software system for control executor faults and control the existing computational-power
Fig. 2. Graph of Performance of Proposed Automatic framework for control executors

Figure 2 are showing the response time (in milliseconds). It is helpful for maintain the required level of accessible computational power. Results are displaying that there is no key change in time with respect to distance. When the distance between machine increases, there is no major change in time. Framework can perform in milliseconds. Separation of roughly 22 meters in nodes, 55 milliseconds are imperative to enhance the power. It is not achievable in manual endeavor. Manual work cannot perform in milliseconds to perform the same task.

Figure 3-GUI of Proposed automatic monitor system to find the normal and faulty node
Figure 3 of proposed system demonstrates the status of machines. Console chart shows current status of accessible power.

Figure 4-GUI of Proposed automatic monitor system for automatic start of executor node from remote node in fifty seven milliseconds

In Figure 4, Graphical client interface is displaying after detection of executor fault in alchemi grid middleware. Graphical user interface demonstrates two machines with ordinary (green) signs. Accessible computational power can maintain in fractions of seconds consequently. Proposed System is competent for control execution processes.

Figure 5- Response time comparison graph in between the manual solution with Proposed Automatic framework
Figure 5 describes the huge difference in between the time of manual effort and automatic effort. The proposed framework is developed in the C# .NET platform. It is supportive to control the executors in Alchemi grid. It is supportive to maintain the level of processing power by using automatic framework.

6. Conclusion of Research work

This Research work has decided to control available computational power in the desktop grid middleware, if there should be an occurrence of deficiencies in execution nodes. This research has developed the automated software framework for control on computational power in Alchemi desktop middleware. Research work has identified the inconveniences related to faults. Graphical client interface has given extremely fast and straightforward results. Alchemi middleware has selected due to support for windows environment. Developed Framework can control the execution processes rapidly, which can't handle with by the manual technique in this quick time. Graphical perspective of the framework is helpful for the user correspondence with running grid. Human endeavors will diminish by use of software based framework. Manual methodology will be defeated by use of programmed procedure to recover faults in Alchemi desktop middleware. Proposed automated framework will provide the fast control on the executors. This Research concludes that development of automated programmed frame work is urgent requirement of time to deal with grid faults. Executor shortcomings can be control rapidly i.e. in milliseconds. Human Efforts can be removed by computerized Software system.

References