CHAPTER 8

SUMMARY AND FUTURE SCOPE

8.1 CONCLUSION

Matchmaking is a process of evaluating the degree of similarity between any two objects. In the Grid environment, before resources can be allocated to a job, the user must select resources appropriate to the requirements of the user. In this thesis, the recently proposed matchmaking models have been analyzed and are classified into different categories based on its distinguished features. The extensive literature survey of matchmaking models enabled to define the problems clearly that exists in the field of matchmaking.

To improve the matchmaking process, a novel Three Dimensional Matchmaking Model (*TDMM*) has been proposed which selects optimal resource for a job. The *TDMM* considers three dimension’s parameters viz. static, dynamic and behavioral to select suitable resource for a job. This increases the precision of matchmaking and best resource is selected for a job. As the behavioral parameters of resources are considered in the matchmaking process, the job’s successful allocation is assured. The updation of dynamic and behavioral parameters of the resources in the resource repository at every \( \Delta t \) time by the service providers and the knowledge unit respectively gives the up to date
information to the three dimensional matchmaking engine for \textit{rank\_list} calculation. Thus the \textit{TDMM} is reliable to the changing environment.

The \textit{TDMM} has been simulated using gridsim toolkit and adequate experiments were conducted to evaluate the performance of \textit{TDMM}. The experiments were conducted with 75 service providers evenly distributed in all grid sites and the number of jobs submitted ranges from 600 to 1800. The performances are rated against the significant metrics viz. average response time, average number of successful jobs and average number of failed jobs. The proposed \textit{TDMM}'s performance was observed and compared with \textit{CONDOR} and \textit{FCONDOR}. From the result, it has been found that, as the input load increases the proposed \textit{TDMM} outperforms \textit{CONDOR} and \textit{FCONDOR} by nearly completing all the submitted jobs. Analysis was done to study the variations in the average response time and the average number of successful jobs when the matchmaking process uses one dimensional parameters, two dimensional parameters and three dimensional parameters. It has been found that, when three dimensional parameters are considered during matchmaking process, the average response time is reduced which increases the speed of the allocation and the average number of successful jobs.

The \textit{TDMM} differentiates the job into ‘\textit{mature}’ and ‘\textit{new}’ based upon the similarity index \((SI)\). For ‘\textit{mature}’ jobs, the \textit{TDMM} uses the already calculated \textit{rank\_list} of resources for allocation. For ‘\textit{new}’ jobs, the resource analyst performs the preliminary selection of resources by considering the static parameter resource type \((R_c)\) and retrieves the resources of that resource type. The resource capabilities of the resources selected in the preliminary selection are passed to the three dimensional matchmaking engine for \textit{rank\_list} calculation. Sufficient experiments were conducted to compare the average
number of successful jobs when ‘new’ jobs and ‘mature’ jobs are submitted by the user. It has been observed that the TDMM successfully completes more number of jobs when ‘mature’($m_j$) jobs are submitted to it.

The TDMM is analyzed for adaptability by changing the resource ingress and egress levels and the average number of successful jobs in each level were found. It has been found that the TDMM was able to complete significant number of jobs in all resource ingress and egress levels. The TDMM was then analyzed by increasing the number of ‘new’($n_j$) jobs in a batch of jobs and the average response time were calculated. From the results, it has been found that there was a slight increase in the average response time when there are more number of ‘new’($n_j$) jobs in a batch of jobs.

When the resource fails, the TDMM performs rescheduling of resources and allocates the next highly ranked resource to the job without any delay. Experiments were conducted by increasing the number of jobs submitted to the grid sites and the average number of failed jobs for both low and high resource ingress levels was found. From the results, it has been found that the TDMM endures failures by minimizing the average number of failed jobs for various resource ingress and egress levels.

Experiment was conducted to compare the performance of TDMM that categorizes the job into ‘mature’ ($m_j$) and ‘new’($n_j$) and TDMM that does not categorize the job into ‘mature’($m_j$) and ‘new’($n_j$). From the result it has been found that TDMM that categorizes the job has less average response time than TDMM that does not categorize the job.
The performance of TDMM is further improved by incorporating dual queues in the resource analyst (DQTDMM) viz. mature_job queue and new_job queue. The performance of DQTDMM (Dual Queue Three Dimensional Matchmaking Model) was compared with TDMM (Three Dimensional Matchmaking Model). The average response time and the average number of successful jobs were obtained for DQTDMM. From the results, it has been found that the DQTDMM has minimized average response time than TDMM and increased average number of successful jobs than TDMM. Thus the proposed DQTDMM further minimizes the average response time and increases the average number of successful jobs. Hence it is inferred that DQTDMM outperforms TDMM.

8.2 FUTURE SCOPE

The following research directions can be focused in future to further enhance the system performance to a great extent

1. Priorities can be set for jobs.
2. User behaviors can be studied, analyzed and included as one another dimension in matchmaking process.
3. The user’s matching threshold value can be obtained for each job and the matching may be done accordingly.