CHAPTER 8

CONCLUSION AND FUTURE SCOPE

8.1 SUMMARY OF THE WORK

In this research work, improved meta-heuristic approach has been proposed for solving the virtual machine placement problem in cloud computing environment. As the resource pool of the cloud is very large, the meta-heuristic algorithm works better by providing a near by optimum solution in a short duration of time due to the reason that global and local search capability are balanced by inertia weight. Cloud resource management problem which allocates the computing resources is addressed in a way that providers can achieve good revenue. The experiments are performed for the real time benchmark data which are given input for the proposed and existing virtual machine allocation algorithms.

In chapter 3, meta-heuristic based Enhanced PSO algorithm (EPSO) has been proposed for the power-aware virtual machine allocation in the cloud environment. The results show that the proposed PA-EPSO algorithm produces better results than SAPSO and Standard PSO in terms of minimizing the power consumption of datacenters. The results obtained show that the proposed algorithm is well-suited for the VM allocation problem with the objective of power-aware optimization. The proposed PA-EPSO algorithm minimizes the power consumption of the datacenter at an average of 13.42%
over existing SAPSO and 14.75% over standard PSO algorithm. In order to get further improvement in power efficiency, power-aware dynamic consolidation is proposed for eliminating idle power wastage.

In chapter 4, power-aware dynamic consolidation algorithm is proposed by considering minimizing the power consumption of the datacenter. In the power-aware dynamic consolidation, power consumption is reduced by dynamically deactivating and reactivating physical nodes to meet the current resource demand. From the results, it can be seen that the proposed PA-DC algorithm achieves an average of 19.65% of power savings over MBFD algorithm. An average of 12.41% minimization of number of VM migrations has been achieved by the proposed PA-DC algorithm over the MBFD algorithm. The results obtained show that the proposed algorithm is suitable for handling the virtual machine consolidation problem for power efficiency in the cloud computing environment.

In chapter 5, meta-heuristic based Enhanced PSO algorithm (EPSO) has been proposed for the resource wastage aware virtual machine allocation in the cloud environment. The RW-aware-EPSO algorithm works on minimizing the resource wastage in the cloud datacenter. The proposed research work shows that by knowing the category of a virtual machine, virtual machine placement can be made in an optimum manner. The proposed RW-aware-EPSO algorithm minimizes the RW of the datacenter on an average of 32.42% over existing PSO algorithm.

In chapter 6, dynamic consolidation of the VM with the objective of minimizing the number of VM migration is proposed. The proposed algorithm uses the RW value of the host to select the VM for migration. The proposed RW-aware-VMmigration algorithm minimizes the number of VM
migrations in the datacenter on an average of 11.52% over existing Black-box algorithm.

In chapter 7, Private cloud is established using the open source cloud technologies OpenStack and UEC. The virtual machine placement algorithms used in the private cloud are studied. An add-on to the Horizon – OpenStack Dashboard is developed which gives alert messages to the cloud administrators when resources are over-utilized and under-utilized in the hosts.

8.2 SUGGESTIONS FOR FUTURE WORK

- Other meta-heuristic algorithms to achieve better results can be investigated for the VM allocation problem in the cloud computing environment.
- A multi-objective algorithm can be developed to find out an optimal point in minimizing the resource wastage and power consumption of the datacenter.
- The proposed VM allocation and consolidation algorithms will be implemented in the cloud simulator.
- The proposed VM allocation and consolidation algorithms can be integrated with the open source cloud technology OpenStack.
- For consolidation of VMs, adaptive utilization threshold can be incorporated.
- Migration time and performance degradation of the VMs due to the dynamic consolidation will be measured.
- A test bed with the multi-node private cloud has been established and an add-on to Horizon is developed. The present system can be further enhanced by calculating the overall power consumed by each host and
displaying it in the chrome extension. To minimize the power consumption, a scheduling algorithm can be proposed which allocates the incoming VM requests to the appropriate hosts. A daemon process should be made running as a background process to check the capacity of the hosts and the number of instances in it. When a host is detected as underutilized, the instances in the host can be migrated to some other active host and the host can be put in either idle or in a sleep state. This way of dynamic consolidation of VMs results in minimal power consumption. In future, this dynamic consolidation concept will be integrated with open source cloud technology OpenStack.