CHAPTER 3

AIMS AND OBJECTIVES

3.1 INTRODUCTION

The various research issues discussed in Chapter 1 highlighted the open challenges in distributed environment that needs the attention of researcher world-wide. Literature review in Chapter 2 has spotlighted the main facets related to task scheduling in such environment. This chapter presents few of those research issues along with their viable solutions that have been carried out in this research assignment.

3.2 CHALLENGING RESEARCH ISSUES AND Viable SOLUTIONS

A detailed study of the literary works reveals that there are various unfold challenges to achieve the efficient and secure task scheduling in the arena of distributed environment. In this section, issues are highlighted along with their possible solutions as described below:

- **Comparison of various heuristic and metaheuristic task scheduling algorithms for distributed environment.**

  Distributed environment has gained more popularity in present era due to its ability to provide resources in a reliable and cost-effective manner. To meet the ever-increasing computational demand of complex applications, efficient application scheduling on distributed resources is of utmost importance.

  **Viable Solution:**

  Previous works have proposed many heuristic and meta-heuristic based approaches to deal with task scheduling problem. On the basis of extensive
survey of collected research work, a hybrid metaheuristic technique will be identified and implemented to generate optimal tasks schedules.

- **Design and develop a workflow scheduling algorithm for cloud environment.**

  In the cloud environment, most of the applications are composite in nature. Normally, workflow based scheduling is termed as DAG (Directed Acyclic Graph) based scheduling. DAG shows the dependencies between the tasks and their communication cost. DAG based applications are scheduled in parallel environment with resource sharing which lead to more complexity in the scheduler design. All the existing approaches in the composite environment achieve the optimum level up to a little degree but not facile to give the coveted level of optimum results.

**Viable Solution:**

The inmost understanding of related literary works motivates to draft a felicitous workflow scheduling algorithm which can give the reduced makespan with improved resource utilization in the system while considering the precedence constraint and data dependencies of tasks. The majority of proposed algorithms are concerned to reduce the execution time ignoring the load management of resources on concurrent basis because resource improved utilization and minimum execution times are contradictory objective function.

- **Design and develop a security-aware independent task scheduling algorithm**

  Security has been considered as one of the key factor in the adoption of any distributed environment. Scheduling of applications in a secure distributed environment demands the mapping of tasks on to those resources that can meet the task’s security requirements.
Viable Solution:

A genetic based approach in combination with other heuristics can be used to schedule independent tasks in a distributed environment with an aim to improve the makespan and resource utilization while keeping security overhead to the minimum.

- **Design and implement a trust based model for cloud environment.**

Though the cloud computing is providing lot of promising features to cloud customers in terms of accessing infrastructure, platform and software applications as services anywhere and anytime. Still, the customers are reluctant in the adoption of cloud paradigm due to lack of trust on the service providers.

**Viable Solution:**

The trust of an entity can be measured in a particular regard like security, reliability, availability or any other property. Incorporating trust in any system involves trust establishment and evaluation. Fuzzy based trust management system can be developed to evaluate the overall trust value associated with a service provider.

- **Design and implement energy-aware scheduling approach for cloud datacenters.**

The enormous growth of large-scale computing datacenters has posed huge energy requirements. Energy-aware scheduling algorithms will not only reduce the operational cost of datacenters but also save the environment by reducing the carbon emission from such datacenters.
Viable Solution:

Most of the physical servers make use of virtualization technique as it provides flexibility in managing resources due to its ability to turn on/off or even migrates the virtual machines (VMs) among physical machines (PMs). An efficient VM placement strategy considering the multiple resource demands of VMs can significantly reduce the requirement of active PMs and in turn the energy demands of datacenter.

3.3 OBJECTIVES OF THESIS

Although a lot of research has been carried out to handle the scheduling problems in various computing paradigm, the issue to design and develop secure and efficient task scheduling in distributed environment is still wide open. In order to tackle the above problems, the following contributions are made:

- The study and assessment of existing task scheduling algorithms for the better understanding of their functioning and scope of improvement.
- Use of metaheuristic based approach for dynamic scheduling of composite tasks in a distributed environment.
- Develop solutions which also take into account the resource utilization and load balancing, while attempting to minimize the execution time of applications.
- Design and implement a trust model for scheduling applications in distributed environment.
- Develop a solution that is not only efficient in terms of meeting security and scheduling environment but also cost effective and applicable in practical environment.