ABSTRACT

The main objective of this research is to develop the effective architectural model to show the task scheduling of real-time task in embedded application. This research focuses on developing a secured web-based architectural model to simulate the execution of real time tasks.

Scheduling is a key concept in computer multitasking, multiprocessing operating system and real-time operating system designs. Different CPU scheduling algorithms have different properties and may favor one class of processes over another. The properties of various algorithms are needed to be considered while selecting the algorithm to be used. Even though there is a lot of scheduling algorithms, just a few of them are suitable in a real time embedded application. In order to test and evaluate a scheduling policy, there must be some kind of simulator framework to test and evaluate them. The real-time simulator shows the graphical form and status report of the task execution. According to status report displayed by the simulator, the user can make a comparison to select the best algorithm to execute the particular given task set. Tasks can be periodic or aperiodic, dependent or independent and time constraint may be hard or soft. The proposed model can
be used for preprogrammed scheduling policies for uniprocessor systems. This model provides user-friendly Graphical User Interface (GUI).

This research work has its applications as a teaching tool to learn scheduling mechanisms in real-time embedded applications. The real time simulator simulate the scheduling of real-time tasks in the operating system environment and the task scheduler co-processor is used to show the real time execution of tasks in hardware environment.

Since this architecture is web-enabled, there are various web-related attacks such as brute force attacks, denial of service attacks, etc. This research work focuses on preventing denial of service attacks on the proposed simulator. Attacks flood the system with unwanted request thereby using all the bandwidth available in the system and preventing the legitimate users from accessing system resources. To avoid this scenario an architecture using location-hiding approach concept is developed and implemented to prevent the attacks on the server which contains the files of real time simulator.

This research work discusses the various real time scheduling concepts in the beginning. The design of real-time simulator in Labview and web-based Real time Simulator in Java is described extensively. This research work also explains design and development of real time algorithms. In web-based real time simulator, the user can develop their own algorithm and verify the timing and statistics of the algorithm using the simulator. The code of
output modules which are compiled is presented to the user. The user can download these modules from the web architecture and integrate them in his or her algorithms. The future simulator must explain all scheduling policies of multiprocessor systems and should also be able to explain the operating system characteristic and real time characteristic in the system. Another issue that can be focused in future systems is the easy way of integration of proprietary algorithms in the system. The proposed model has been developed and implemented in real time embedded applications.