

Design and Performance Analysis of Resource Management Algorithms in Response to Emergency and Disaster Situations

Authors : Volkan Uygun, H. Birkan Yilmaz, Tuna Tugcu

Abstract : This study focuses on the development and use of algorithms that address the issue of resource management in response to emergency and disaster situations. The presented system, named Disaster Management Platform (DMP), takes the data from the data sources of service providers and distributes the incoming requests accordingly both to manage load balancing and minimize service time, which results in improved user satisfaction. Three different resource management algorithms, which give different levels of importance to load balancing and service time, are proposed for the study. The first one is the Minimum Distance algorithm, which assigns the request to the closest resource. The second one is the Minimum Load algorithm, which assigns the request to the resource with the minimum load. Finally, the last one is the Hybrid algorithm, which combines the previous two approaches. The performance of the proposed algorithms is evaluated with respect to waiting time, success ratio, and maximum load ratio. The metrics are monitored from simulations, to find the optimal scheme for different loads. Two different simulations are performed in the study, one is time-based and the other is lambda-based. The results indicate that, the Minimum Load algorithm is generally the best in all metrics whereas the Minimum Distance algorithm is the worst in all cases and in all metrics. The leading position in performance is switched between the Minimum Distance and the Hybrid algorithms, as lambda values change.

Keywords : emergency and disaster response, resource management algorithm, disaster situations, disaster management platform

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