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# A PROBABILISTIC COST ESTIMATION MODEL FOR RFID REAL-TIME APPLICATIONS IN DATA GRIDS

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Abstract. *RFID is an emerging technology for wireless identification lately. It is crucial to accelerate RFID data processing regarding real-time applications. In order to solve the processing speed problem, Data Grids is a promising solution to the huge amount of RFID real-time data with its high performance computing capability and distributed storage system. RFID differs from Data Grids in protocols, programming interface, and security issues; and thereby an intermediate architecture called RFID-Grid proxy is proposed. In this architecture, we use a probabilistic cost estimation model of M/M/m queuing system to schedule RFID jobs considering the system load balance, real-time throughput, and deployment cost. Analysis and simulation results indicate that the proposed method is more efficient than other methods.*
**Keywords:** Data grids, Job scheduling

1. **Introduction.** Data grid [1-4,13-15] is one of the most popular applications in grid computing concerning data management system and data replication technologies. With considerable storage capacities and an effective data management system, it can deal efficiently with large scale data processing and distributed data access.

Automatic identification technology such as bar-code has been widely used for many decades. RFID (Radio Frequency IDentification) [5,6] gains its popularity because of the remarkable advances in wireless technology with wide applications, and it will replace bar-code gradually. The huge amount of RFID real-time data need to be promptly dealt with so as to interact with the downstream and upstream system on time as in an international warehousing system. Accelerating the process is important to real-time RFID applications.

To solve the processing speed problem in RFID real-time applications discussed above, Data grid is a promising solution to handle massive RFID real-time data owing to its high performance in computing capability and distributed storage system. However, there are little attention and few studies for using grids in RFID because of the native differences between RFID system and Data Grids such as communication protocols, programming interface, and security issues. Therefore, an intermediate architecture called RFID-Grid proxy is proposed in this paper to interconnect the two systems as shown in Figure 1.

In this architecture, RFID jobs are delegated to RFID-Grid proxies. RFID-Grid proxies recognize jobs and pass them to computing resources in Data Grids for further processing. It is imperative to avoid serious delay in terms of real-time throughput in this architecture. However, if too many grid hosts serve as RFID-Grid proxies simultaneously, the overall system performance may be encumbered with low usability of grid resources. Namely, the tradeoff between real-time throughput of RFID jobs and deployment cost of RFID-Grid proxies should be made.