# Chapter 7.38
# High Performance Scheduling Mechanism for Mobile Computing Based on Self-Ranking Algorithm

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## ABSTRACT

Due to the rapidly increasing number of mobile devices connected to the Internet, a lot of research is being conducted to maximize the benefit of such integration. The main objective of this article is to enhance the performance of the scheduling mechanism of the mobile computing environment by distributing some of the responsibilities of the access point among the available attached mobile devices. To this aim, we investigate a scheduling mechanism framework that comprises an algorithm that provides the mobile device with the authority to evaluate itself as a resource. The proposed mechanism is based on the "self ranking algorithm" (SRA), which provides a lifetime opportunity to reach a proper solution. This mechanism depends on an event-based programming approach to start its execution in a pervasive computing environment. Using such a mechanism will simplify the scheduling process by grouping mobile devices according to their self-ranking value and assigning tasks to these groups. Moreover, it will maximize the benefit of the mobile devices incorporated with the already existing Grid systems by using their computational power as a subordinate value to the overall power of the system. Furthermore, we evaluate the performance of the investigated algorithm extensively, to show how it overcomes the connection stability problem of the mobile devices. Experimental results emphasized that

the proposed SRA has a great impact in reducing the total error and link utilization compared with the traditional mechanism.

## INTRODUCTION

Mobile computing and commerce are spreading rapidly, replacing or supplementing wired computing. Moreover, the wireless infrastructure upon which mobile computing is built may reshape the entire information technology (IT) field. Therefore, it is fair to say that nowadays, mobile devices have a remarkable high profile in the most common communication devices. Individuals and organizations around the world are deeply interested in using wireless communication, because of its flexibility and its unexpected and fast development. The first solution to the need for mobile computing was to make computers small enough so they could be easily carried. First, the laptop computer was invented; later, smaller and smaller computers, such as 3G, personal digital assistants (PDAs) and other handhelds, appeared. Portable computers, from laptops to PDAs and others, are called mobile devices. In recent years, a great development took place on the Internet and with mobile technologies. Consequently, the next step will be merging these two technologies, leading to the Wireless Internet. The Wireless Internet will be much more than just Internet access from mobile devices; the Wireless Internet will be almost invisible, as people will use mobile services and applications directly. On the other hand, these services and applications will be acting as our agents, conducting searches and communicating with other services and applications to satisfy our needs. Not only will the integration of mobile technology and the Internet paradigm reinforce the development of the new context-aware applications, but it also will sustain traditional features, such as user preferences, device characteristics, properties of connectivity and the state of service and usage history. Furthermore, the context includes features strictly related to user mobility, such as a user's current geospatial location (time and/or space). As direct use of existing Internet applications in a mobile environment is usually unsatisfactory, services and applications need to take into account the specific characteristics of mobile environments. The next section will provide an overview of mobile devices as well as the present relation model between mobile devices and the Grid.

### Mobile Devices' Development

The number of individuals and organizations relying on wireless devices is continually increasing. Table 1 represents a statistical study of current and future increase in the sales of wireless equipment and the considerable growth in the sales of mobile phones.

Table 1 shows the rapid growth in sales rates of wireless equipment, and they serve the purpose of being a good metric of the flourishing future of mobile computing. From 2001 to 2005, investments on mobile devices are expected to increase by 41% and reach $31 billion. In 2004, the laptops on the market reached 39.7 million. On the other hand, not only did the number of mobile devices and wireless equipment increase, but also the computational power and memory storage. As a result, mobile computing and wireless Internet became a very important research area. This article will approach it from the computational Grid viewpoint.

### Mobile Devices and the Computational Grid

The interaction between mobile devices and the computational Grid, such as depicted in Figure 1, can be classified into two models:

1. **Mobile as a user of Grid resources:** The development in the computational power of mobile devices, such as smart phones,