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Implementing Knowledge-Based Systems in Monitoring Real-Time Systems

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Real-time data processing systems generally contain a series of complex, heterogeneous, and critical processes. To increase their efficiency, different monitoring programs, tools, algorithms, and rules are utilized. These programs are used for detecting anomalous behaviors, tracing workflow progress, and generating alerts and reports during the different stages of the system.

Monitoring these systems includes collecting, and inferring the different information concerning the characteristics and status of the different critical resources. The inference rules of the monitoring programs are integrated within the code itself which complicate them and lead to spend longer time for introducing new or simple rules. In addition, the process of integration and fusion of the different knowledge and information of these systems is a tedious and complicated process, time consuming, and needs more human resources. As a consequence, the learning process and knowledge transfer of these systems become very complicated and even very slow.

Knowledge-based systems have been used in almost all life aspects. Recently, they

have been integrated and embedded with almost all the different programming languages leading to rapid, intelligent and flexible systems. Implementing knowledge-based techniques to monitor nuclear explosions help in building simple, uniform, flexible and scalable systems and separate the inference rules from the data collection and retrieval processes.

In this paper a suitable knowledge-based system, Clips and Perl with Extensions (CAPE), is adopted. This paper presents the implementation of CAPE to build a simple and web-enabled knowledge-based system for nuclear explosion monitoring. This prototype is used to monitor the processing of data received continuously by the International Data Centre (IDC) of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). The current developments, advantages, and disadvantages of this approach are presented. In addition, future directions and recommendations are discussed.