Designing for Embedded Parallel Computing Platforms: Architectures, Design Tools, and Applications

Architectures Session

Constrained Collaborative Power Management

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Abstract

The market requires more and more versatile mobile devices with multiple functions oriented to several use scenarios. Energy efficiency in particular, being a key feature to improve the portability of such class of devices, becomes a high priority design goal.

In order to provide advanced features, producers have developed sophisticated hardware architecture that are typically based on complex SoC cores and supporting several heterogeneous peripherals. Meanwhile the shortening of the overall design time due to constraining time-to-market of such systems is enforcing more comprehensive design approaches and the adoption of solutions that are easily /portable /among different products.

The need to provide multiple heterogeneous functionalities leads to the natural choice to gear these devices with evolved basic software. Thus the use of general purpose operating systems like Linux is becoming a common choice because of their natural predisposition to /adapt easily /to different application contexts.

The implementation of the necessary mechanisms to optimize both power and performances for this class of devices can no longer disregard from the requirements of ease of development, portability and adaptability.

In this poster a formal model to define the problem of control of performances and power for this specific class of devices will be presented. Starting from the description of the solution currently available in the Linux kernel we advance the proposal for an extension that is better tailored to embedded mobile system. The experimental results will finally show that the proposed solution is competitive in simplicity and adaptability with respect to current one while ensuring better control on performances and ease of implementation. The value and accuracy of the approach is quantitatively and statistically proved through extensive experiments carried out on a development board designed for multimedia applications and directly implemented in a Linux based system.