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presents

Double-Q Learning-based Power Management

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The Q-learning-based DVFS selection approach has been successfully applied in lowering energy consumption in real-time systems. However, in some stochastic environments, the approach normally picks a number of sub-optimal techniques for task execution due to the overestimation in Q-learning, consequently reducing its effectiveness on energy minimization. In our work, we proposed a Double-Q learning-based DVFS selection scheme to avoid the sub-optimal selections. In the early phase of this thesis work, we conducted experiments in simulated environment and the experiment results show that Double-Q learning-based DVFS method can save more energy than Q-learning when scheduling tasks.

We propose to continue the thesis work to explore the effectiveness of Double-Q learning-based method in real environment. We plan to develop a Double-Q governor in Linux Kernel. This new governor can monitor CPU usage and then issue a corresponding CPU frequency periodically. The energy consumption is measured by a Linux tool on the fly. Preliminary results indicate that our proposed scheme is stable and efficient for energy minimization.