

Implementing a Frequency Scaling Algorithm for iPAQ H3975

CSC 714
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Project Overview

In the world of computing today there is a great need for low power general-purpose processors. This is evident by the number of battery-operated devices in use. Support for energy awareness comes in two flavors: (1) hardware-driven or (2) software-driven. In our research we plan to focus on a software-driven approach. More specifically, we plan to study the benefits of a dynamic voltage-scaling (DVS) algorithm. A brief overview of the project is presented next.

Currently, there are a lot of researches that focus on this topic as listed on the References section. Most of them present algorithms and test results on homegrown systems or open systems environment. This project aims at implementing some of the solutions on a commercial embedded device operating system.

We propose to implement the DVS algorithm we chose through a device driver for Windows CE 3.0 that is installed on the device that we are working on, iPAQ H3975. A more detailed explanation of the work proposed follows.

1. Research available DVS algorithms for possible implementation.
2. Choose suitable DVS algorithm.
3. Research what is needed to write a device driver for Windows CE 3.0.
 - a. Research development tools for Windows CE 3.0 including emulators.
 - b. Learn the new development environment.
 - c. Research requirements for writing a device driver.
 - d. Research benchmark tools to measure power usage (we may need to write one on our own).
4. Discuss and design the approach to implement the DVS algorithm.
5. Implement DVS algorithm
6. Test and validate the implementation on the device (iPAQ H3975)
7. Experimentation
 - a. Collect data from the benchmark tools used.
 - b. Compare results before and after implementation of DVS.
 - c. Establish trends and deduce outcome of the result.

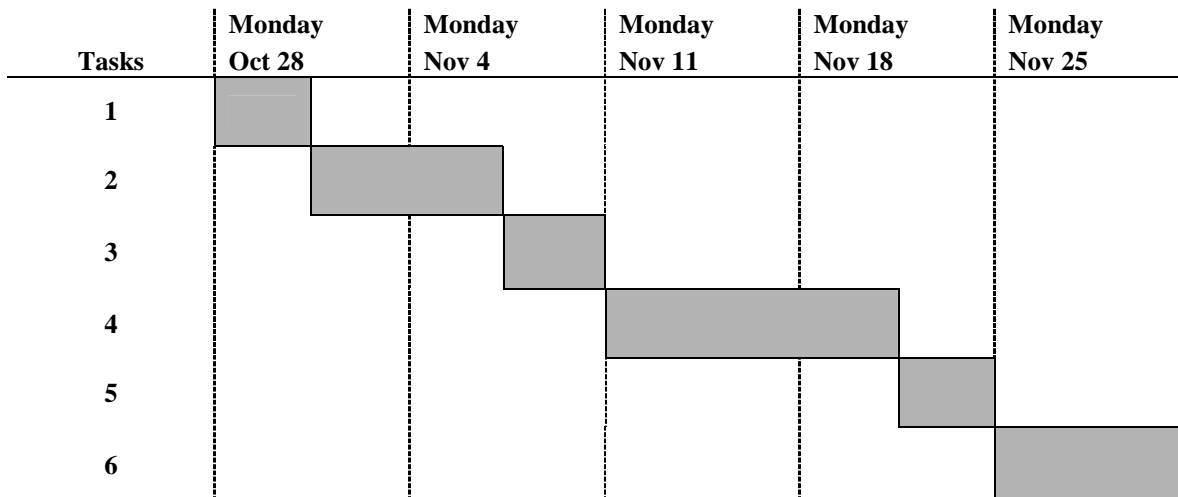
Key Outcomes

As a result of this work, the device will be equipped with support for software-driven dynamic voltage scaling. With the device enabled to support DVS we plan to evaluate the benefit(s), in terms of energy savings, of a DVS algorithm. Time permitting; we will also perform a workload characterization for the algorithm, determining how the algorithm performs for various benchmarks.

Task Assignment

	Task:	Approx. Duration (in weeks)
1	Algorithm Research	0.5
2	Development environment research	1.0

3	Benchmark tool research	0.5
4	Design and implementation of the DVS algorithm	1.5
5	Test and validate implementation	0.5
6	Experimentation	1.0



Project homepage

<http://www4.ncsu.edu/~mwah/index.htm>

References

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