CSC714: Real Time Systems Project – Spring 2009

A New Real-time Kernel development on an embedded platform

Team

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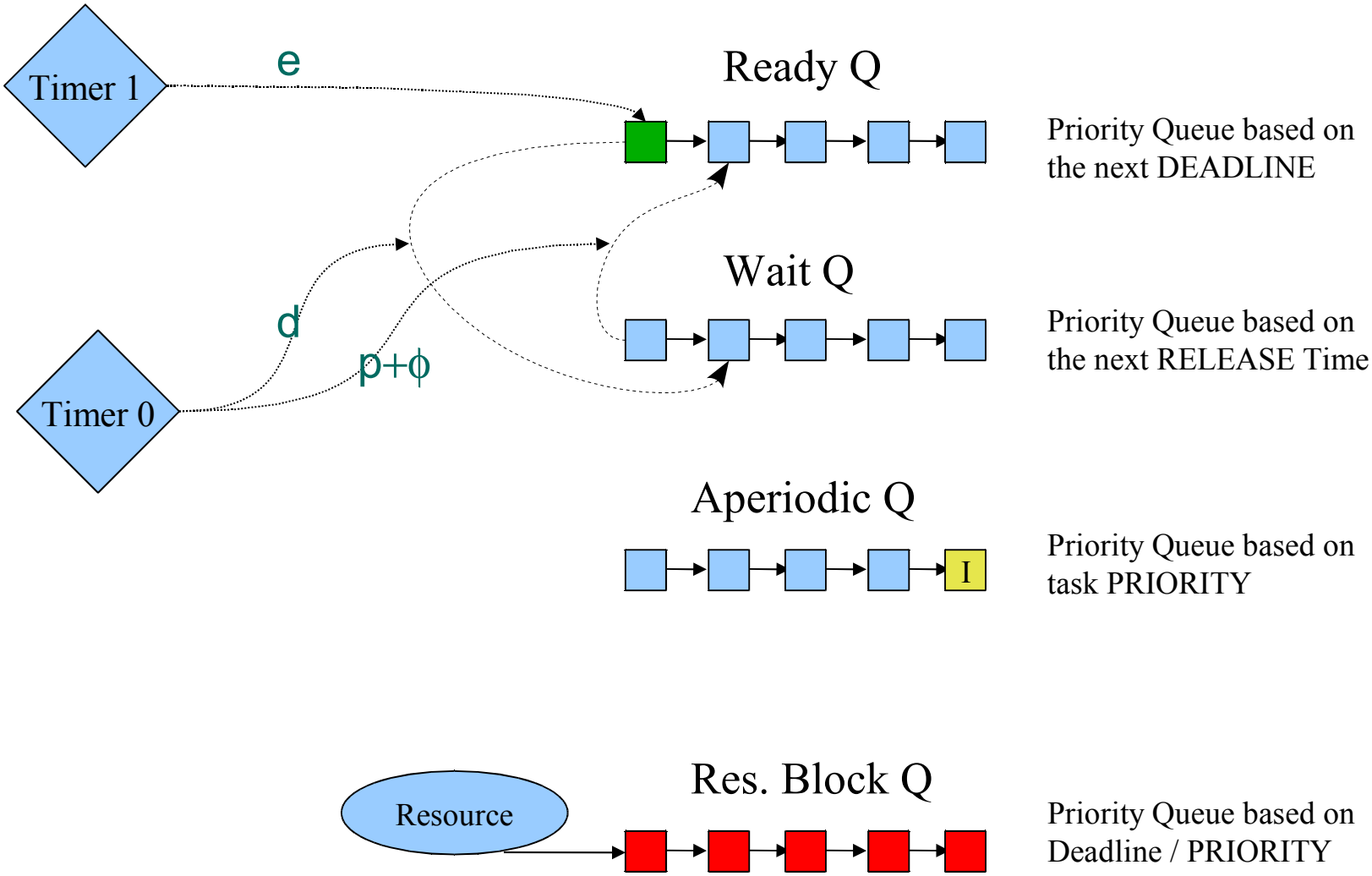
Features

- A new real-time kernel developed from scratch
- Supports Periodic & Aperiodic tasks, Semaphores & Mutex
- EDF based scheduling for periodic tasks (deadlines <= period)
- The scheduler is capable of creating tasks based on (ϕ, p, e, D) parameters.
- 1 uSec granularity for all timing parameters (ϕ, p, e, D)
- Aperiodic tasks are scheduled using static priority based preemptive scheduling.
- The scheduler can also keep track of the current CPU utilization.

Design


Timer 1
e
Ready Q
Priority Queue based on
the next DEADLINE
Wait Q
d
p+ϕ
Timer 0
Priority Queue based on
the next RELEASE Time
Aperiodic Q
I
Priority Queue based on
task PRIORITY
Resource
Res. Block Q
Priority Queue based on
Deadline / PRIORITY

Current Status

➢Completed

- ➢Implemented on C6713 DSK
  - ➢ TMS320C6713 DSP Processor
  - ➢ VLIW Architecture (with 8 instructions / cycle)
- ➢Tested for all parameters (ϕ, p, e, D)
- ➢Keeps track of Deadline miss & TBE counts for every thread
- ➢Also keeps track of thread wise execution time upto 1ms res.
- ➢About 2400 SLOCs of source code (1000 lines assembly)

➢Things to do

- ➢Overall CPU utilization to be maintained
- ➢Test aperiodic tasks with resources
- ➢Implement Sleep
- ➢Fix few bugs
- ➢Test with some real benchmarks