Notes in ECEN 5623

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January 19, 2016

Day three bureacracy

exercise 1 guid on the d2l page. Siewart CH 2.

Lecture

review of rate monotonic scheduling example.
rate monotonic upper bound is sufficient not necessary.
least common multiple of periods.
feasible over LCM, feasible over all time

Complex Multi-service Systems

multiple software services, synchronization and communication between services. Mutliple sensor actuator output interfaces, intermediate IO, shared memory, messaging.

multi-service pipelines diagram.

real time services, multi-service concurrency (multithreaded prolly)

to deal with problems they made real time service and cpu resource management theory.

why SW for hard real time systems?
cost, design time, software is easier to update, fpgas are costly, software is easier to fix
asic

real time is defined by there being deadline events.
without external events, why is it real time? book writer would argue it isn't

Operating System Overview

intermediary interface between apps and hardware
facilitates application development

file system, scheduler, security, ectetera

os comes into existence.

structure types, monolithic (unix and linux), microkernel, most modern commercial adopt a hybrid approach.

embedded os, RTOS, EOS
another option is super-loop (sicklicle executives), this is okay for simple things
rtos, everything is a task scheduled based on demand.
jitter on response time is easier to control

RTOS aims at deterministic foremost, rather than throughput (consistency, reliability)
jitter is a measurement

two design approaches, event-driven and time-sharing
event driven(freertos): preemptive task scheduling, higher priority first, process data responsively time-sharing(linux): lots of overhead, time-sharing, , tasks scheduled on regular clocked interrupt, round robin, more often switching. smoother multitasking

tasks can have 3 states, running, ready, blocked.
task scheduling, preemptive, cooperative, earliest deadline first, usually only one task per CPU at a time

RTOS's: lynx os, OSE, windows CE, freertos, arm keil

key terms: kernel task, Real time process, context switch, preemption, dispatch, Asymmetric multi-processing(AMP), Symmetric multi-processing(SMP), non-uniform memory access (NUMA), Simultaneous multi-threading (SMT), Flynn's taxonomy

Flynn's taxonomy - (single instruction, multi instruction) times (single data, multi-data)

taxonomy - method of classification

Flynn's computer architecture taxonomy

fair vs unfair scheduling: (completely fair scheduler) CFS in linux - fair