

Some Guidelines for Proportional Share Scheduling

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Context

- ◆ Huge number of RT schedulers
 - Which do we use?
 - What are the implications?
- ◆ Proportional share
 - Uses periodic interrupts
 - Can use priority infrastructure
- ◆ But... there is allocation error
 - Optimal error bound is quantum length
 - 10-30ms for GPOS

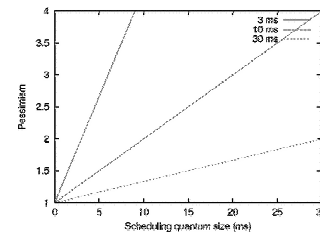
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Real-Time with PS

- ◆ Mapping PS to periodic task model (Stoica et al. 97)
 - Share * period – error > WCET
- ◆ Define *pessimism* P:
 - $P = \text{share} * \text{period} / \text{WCET}$
 - P = 1.0 is ideal
- ◆ A little algebra gives us:
 - $P = (\text{WCET} + \text{error}) / \text{WCET}$

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Pessimism and Quanta



- ◆ Making P small forces small scheduling quanta
- ◆ But...

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Context Switches and Caches

- ◆ Cache cost can dominate OS overhead by orders of magnitude
- ◆ Up to 2.5ms cache preemption cost for threads with 512 KB working set on 500 MHz Pentium III
- ◆ So for real apps quanta cannot be too small

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Conclusion

- ◆ So what do we do?
 - Make OS quantum size flexible
 - Permit latency trading
 - or (more or less) equivalently
 - Use reservation schedulers
- ◆ No single answer – scheduler choice is complex

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