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

Real-Time with PS

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

Pessimism and Quanta

- Making \( P \) small forces small scheduling quanta
- But...

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

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