548

Lecture 11 - Coherence

Essential requirements?

- Must be be single-writer / multiple-reader or stricter

- One owner -> centralization point

- Must be an ordering on requests to each piece of data -> coherence property; ordering across pieces of data -> consistency

How to build directories?

- Requirements

  - Do you need full sharing capabilities?

- Toolkit:

  - Hierarchy

  - Hashing (to avoid high contention on directory)

  - Optimize for the common case

-

A world w/o coherence

- A few pieces of data in *some* applications would be ok

- Software-coherence fence (SCF)

    - Coherent modifications to shared data require an SCF:

        - Write-> SCF -> Readers

        - Readers -> SCF -> Reader -> Write

    - SCF: CLFUSH or IPI/CLFLUSH

Questions

- Does IBM machine support SC or TSO?
- How to scale directory?
- How to scale snoop based systems?
- Snoop not used much, really???
- How to optimize storage requirements of directories?
- Can we use these ideas for distributed systems?
- Can we relax strict coherence requirements?
- How have things evolved from what is described?
- Are there any decentralized solutions?
- How to build a scalable interconnect?
- Is the complexity of all these transient states worth it?
- How much time is spent in each of the MESI states?
- Why not a central switch?