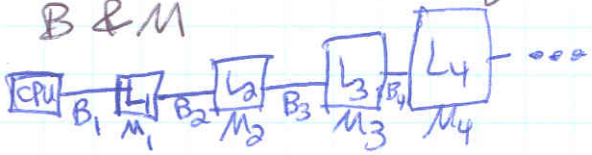
Cache-oblivious model [Frigo, Leiserson, Prokop, Ramachandran – FOCS 1999; Prokop – MEng 1999]

- like external-memory model but algorithm doesn't know B or M (!)
- automatic block transfers triggered by element accesses with offline optimal block replacement
  - FIFO, LRU, or any conservative replacement strategy is 2-competitive given cache of twice the size
  - dropping $M \to M/2$ doesn't affect bounds like $O(\log_{B+1} N)$ or $O(N/B \lg_{M/B} \frac{N}{B})$
- clean model: algorithm just like RAM algorithm
- multilevel memory hierarchies: single algorithm works well on all levels of hierarchy because works well for all B & M
- self-tuning ...



Basic DS Results:

- "B-tree" supporting Insert, Delete, Search in $O(\lg_{B+1} N)$ memory transfers
  [Bender, Demaine, Farach-Colton – FOCS 2000; Bender, Duan, Iacono, Wu – SODA 2002; Brodal, Fagerberg, Jacob – SODA 2002]
- sorting in $O(\frac{N}{B} \lg_{M/B} \frac{N}{B})$ memory transfers
  [Frigo et al. 1999; Brodal & Fagerberg – ICALP 2002]
- ~~prior~~ – tall-cache assumption: $M = \Omega(B^{1+\varepsilon})$
  - impossible otherwise [Brodal & Fagerberg – STOC 2003]
- priority queue in $O(\frac{1}{B} \lg_{M/B} \frac{N}{B})$ am. memory transfers
  [Arge, Bender, Demaine, Holland-Minkley, Munro – STOC 2002; Brodal & Fagerberg – ISAAC 2002]