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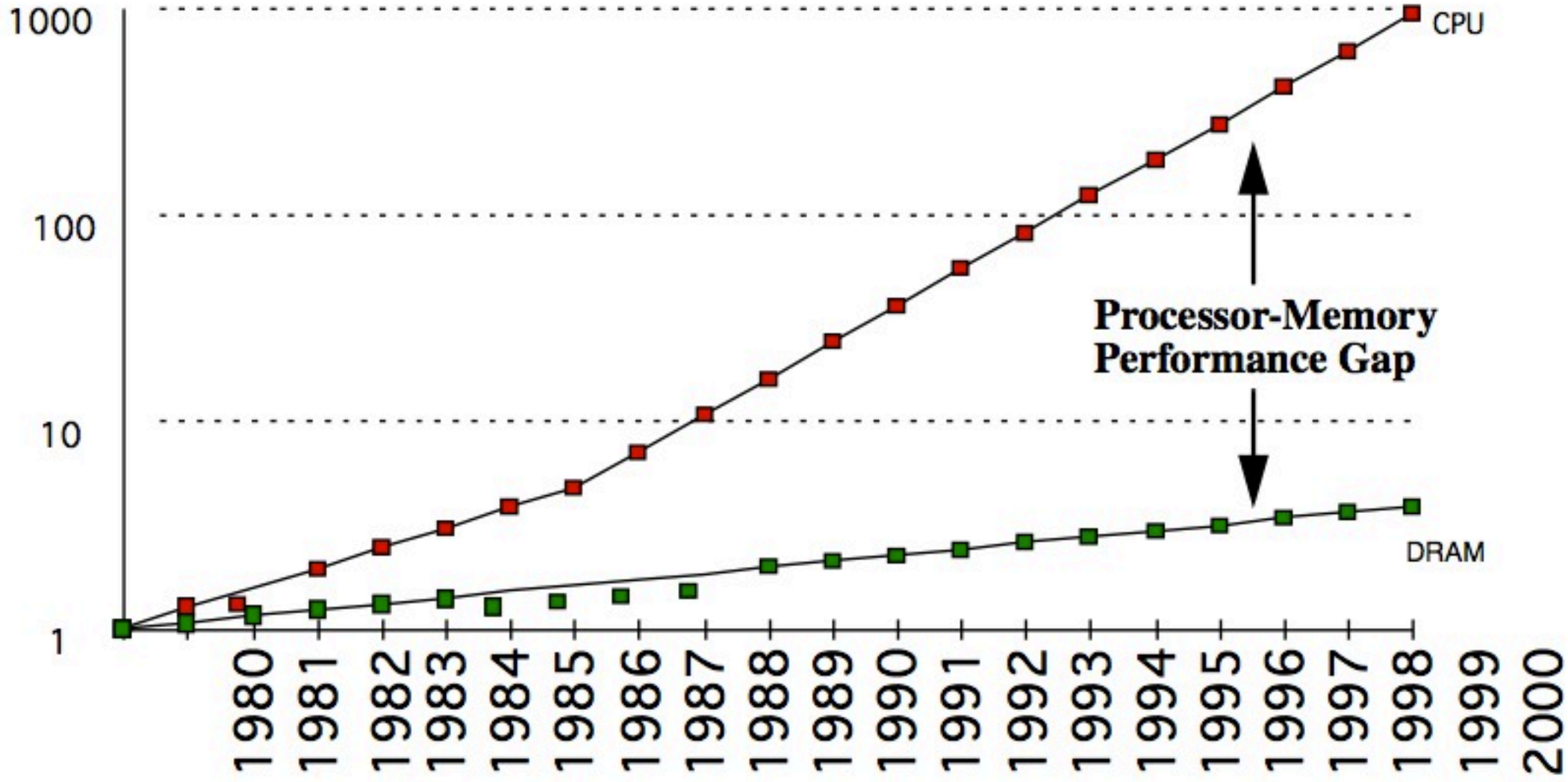
Lecture 9 - Prefetching


1000
100
10
1
CPU
Processor-Memory
Performance Gap
DRAM
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

What to prefetch on?

- Patterns of memory accesses (history):
  - Stride between misses (up/down)
  - General correlations
- Speculative threads
- Program counter / control flow
- Static model
- You can be told to prefetch
- Data
- Other processor or thread behavior

When to prefetch?

- Misses
  - The game is already lost!
  - Good enough
  - Information overload
- Which information stream has the right data in it? Misses or hits or accesses?

Pitfalls?

- Waste of bandwidth
- Extra stuff:
  - Power, area, complexity
- Traffic on coherence bus
- Potentially hurt someone else in a MP system
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