More bounds

6.897
L3.5
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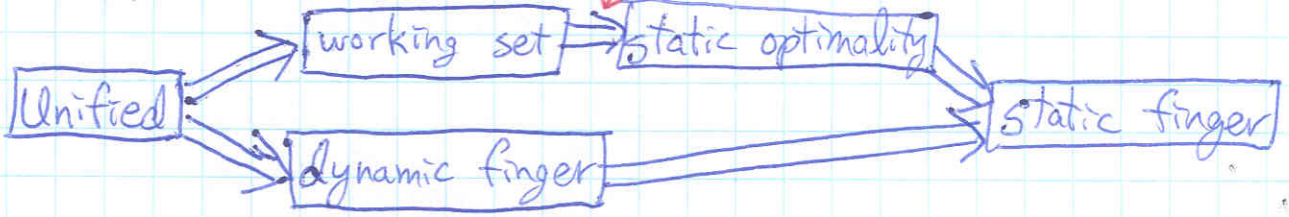
- **scanning theorem** [Tarjan – Combinatorica 1985]
  accessing all elements in order costs $O(n)$
  (starting from any tree)

- **dynamic finger theorem** [Cole – SICOMP 2000]
  accessing x_i costs $O(\lg(1+|x_i - x_{i-1}|))$ am.
  (assuming $m \geq n$)

OPEN:

- **deque conjecture** [Tarjan – Combinatorica 1985]
  alternating between advancing (moving by 1) on left/right costs $O(m+n)$
  – $O((m+n)\,\alpha(m+n))$ [Sundar – Combinatorica 1992]
  – special case of "2 dynamic fingers"
- **traversal conjecture** [Sleator & Tarjan – JACM 1985]
  accessing elements in order given by pre-order traversal of fixed tree costs $O(n)$, starting from any tree
- **unified conjecture** [Iacono – SODA 2001]
  cost to access $x_i = O(\lg \min_y [t_i(y) + |x_i - y| + 2])$
  (temporal dist. / spatial dist.)
  "fast if close to something accessed recently"
  – achievable by pointer machine/comparison DS
  [Iacono – SODA 2001; Bădoiu & Demaine – LATIN 2004]
  – not known whether any BST achieves this (unlike deque/traversal)

Bound implications: [Iacono – SWAT 2000 & SODA 2001]