Tree-layout problem

6.897
L18.1
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- given fixed-topology tree (e.g., trie)
- how should we store the tree in memory to minimize # memory transfers along root-to-leaf paths

either – minimize maximum cost (worst path)
– minimize expected cost (average path)
↳ given probability of accessing each leaf (stochastic)

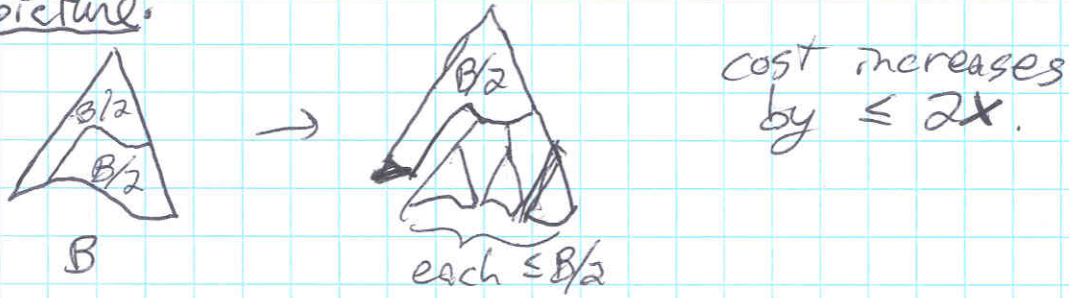
Basic properties:

- convexity: each block in optimal layout might as well store nodes from connected subtree

Proof by picture:

- monotonicity: increasing B only decreases optimal cost. (blocks needn't be full)
- smoothness: optimal cost for $B/2 \le 2\times$ optimal cost for B

Proof by picture:



Minimizing maximum cost [Clark & Munro – SODA 1996]

- easy when you know B — $O(N)$ time
- greedily build layout bottom-up
  - put each leaf in its own block
  - merge blocks of children when possible, giving priority to subtrees with largest max. cost so far

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