Project

Dates

• Classes end 12/13, wednesday
• Final homework due 12/12, tuesday
• Project due 12/8 (MIT restriction)

Options

• Reading project
  – Read some hard papers
  – Write about them more clearly than original
  – graded on delta
  – best source: STOC/FOCS/SODA

• Implementation project
  – read some randomized algorithms papers,
  – implement
  – develop interesting test sets
  – identify hard cases
  – devise heuristics to improve

• In your work:
  – use a randomized algorithm in your research;
  – write about it

MST

Review Background

• kruskal
• boruvka
• verification

sampling theorem:

• Heavy edges
• pick $F$ with probability $p$
• get $n/p$ $F$-heavy edges

Recursive algorithm without boruvka:

$$T(m,n) = T(m/2,n) + O(m) + T(2n,n) = O(m + n \log n)$$

(sloppy on expectation on $T(2n,n)$)

Recursive algorithm with 3 boruvka steps:

$$T(m,n) = T(m/2,n/8) + c_1(m+n) + T(n/4,n/8)$$
$$\leq c(m/2 + n/8) + c_1(m + n) + c(n/4 + n/8)$$
$$= (c/2 + c_1)m + (c/8 + c_1 + c/4 + c/8)n$$
$$= (c/2 + c_1)(m + n)$$

so set $c = 2c_1$ (not sloppy expectation).

Notes:

• Chazelle $m \log \alpha(m,n)$ via relaxed heap

• Ramachandran optimal deterministic algorithm (runtime unknown)

• open questions.