This lecture covers our second of two lower bounds. This one is work by Mihai Pătraşcu (former 6.851 TA) and myself. We'll show that maintaining a graph subject to edge insertion, edge deletion, and connectivity queries (are v & w connected by a path?) requires $\Omega(\lg n)$ time per operation, even if the graph is just a bunch of paths. This in particular proves optimality of the logarithmic dynamic tree data structures, and shows that the $O(\lg^2 n)$ data structure we saw for general graphs is pretty good. The lower bound introduces a new but very simple technique, which at the time was the first "truly logarithmic" lower bound for a natural problem, yet the whole proof is relatively clean.

6.851 Advanced Data Structures

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