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Popularity-Driven Networking ELI BEN-NAIM, Los Alamos National Laboratory, PAUL KRAPIVSKY, Boston University — We investigate the growth of connectivity in a network. In our model, starting with a set of disjoint nodes, links are added sequentially. Each link connects two nodes, and the connection rate governing this random process is proportional to the degrees of the two nodes. Interestingly, this network exhibits two abrupt transitions, both occurring at finite times. The first is a percolation transition in which a giant component, containing a finite fraction of all nodes, is born. The second is a condensation transition in which the entire system condenses into a single, fully connected, component. We derive the size distribution of connected components as well as the degree distribution, which is purely exponential throughout the evolution. Furthermore, we present a criterion for the emergence of sudden condensation for general homogeneous connection rates.

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