We are interested in topologies in which it is possible to route a packet in a fixed number of hops until it arrives at its destination.
Given a constant d, this paper introduces a new self-stabilizing protocol for the q-ary d-dimensional de Bruijn graph ($q = \sqrt[d]{n}$) that is able to route any search request in at most d hops w.h.p., while significantly lowering the node degree compared to the clique: We require nodes to have a degree of $\mathcal O(\sqrt[d]{n})$, which is asymptotically optimal for a fixed diameter d.
The protocol keeps the expected amount of edge redirections per node in $\mathcal O(\sqrt[d]{n})$, when the number of nodes in the system increases by factor 2^d.
The number of messages that are periodically sent out by nodes is constant.