

POCS OP 2

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Question:

Compare the scalability of the GNS and Chord systems.
Feel free to make simplifying assumptions, but state them clearly.

(Write your answer inside the box below. Anything outside the box will be ignored. Your answer can have at most 10 sentences.)

The most interesting scalability properties of Chord come from the protocol itself. From the hashing algorithm and use of fingers/pointers we get the properties that lookup can complete in $O(\log n)$ messages and each node stores $O(\log n)$ state. GNS uses a hierarchical system, where administrator decisions affect scalability. Take an extreme example, GNS could be configured with one root server ^(directory) pointing to all directories — this would allow any lookup in a constant number of roundtrips, however one directory would store all addresses which would be impractical in a large system. You can imagine an opposite configuration where each directory stores little, but lookups take many roundtrips. A more balanced tree could achieve $O(\log n)$ state and lookup time. Chord has all nodes as equal, which is less flexible/manageable. Another example: adding a GNS directory only requires consulting the parent directory, while adding a Chord node requires some $\log^2(n)$ messages, sublinear, but not constant.