

CTMC Conclusions

Given an irreducible CTMC:

- ▶ it has no or one invariant distribution (finite ones have exactly one)
 - if it has one, then, as time goes to infinity, the proportion of time spent in a state approaches the invariant probability of that state
 - if it does not have an invariant probability, the probability of being in a particular state goes to zero

MC Examples

- ▶ Free-Busy System (finite CTMC)
- ▶ M/M/1 Queue (infinite CTMC)
- ▶ Google PageRank Algorithm

Networks of Queues

- ▶ Traffic partitioning and merging, queues in tandem,...
- ▶ **Jackson's Theorem** (1963):
 - Assuming:
 - nodes provide independent service
 - Poisson arrivals from outside
 - fixed partitioning probability
 - no transport delay
 - then, mean delays can be added together
- ▶ ... not really: the theorem does not hold, an error in the proof was found in 2003!