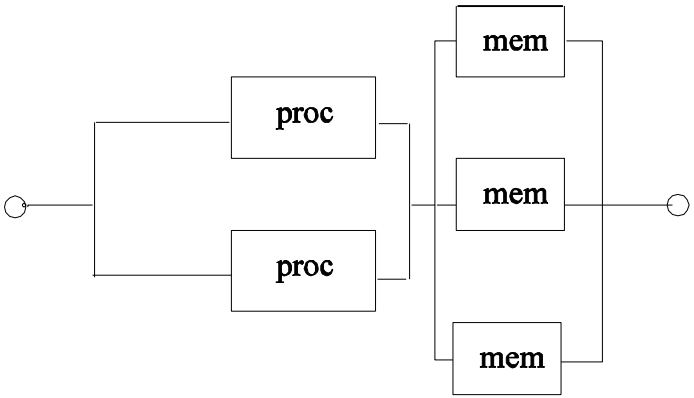
Example

Multiprocessor system with 2 processors and 3 shared memories system. System is operational if at least one processor and one memory are operational.



λ_m failure rate for memory

λ_p failure rate for processor

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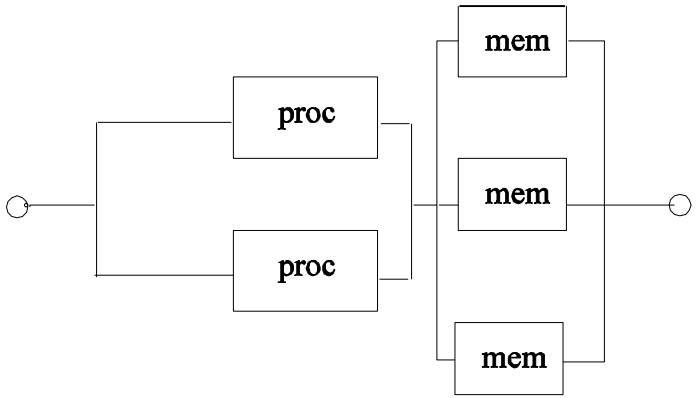
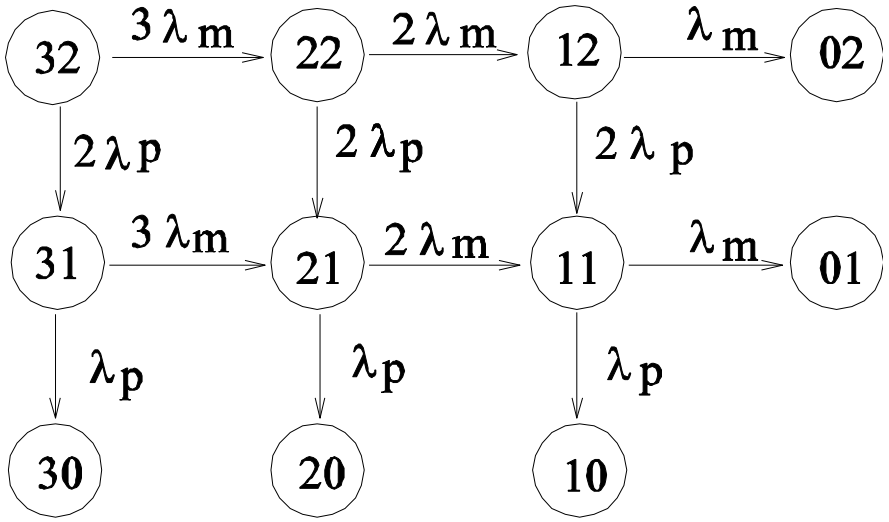


λ_m failure rate for memory
λ_p failure rate for processor

Given a state (i, j):
i is the number of operational memories;
j is the number of operational processors

S = {(3,2), (3,1), (3,0), (2,2), (2,1), (2,0), (1,2), (1,1), (1,0), (0,2), (0,1)}

Markov chain



λ_m failure rate for memory
λ_p failure rate for processor

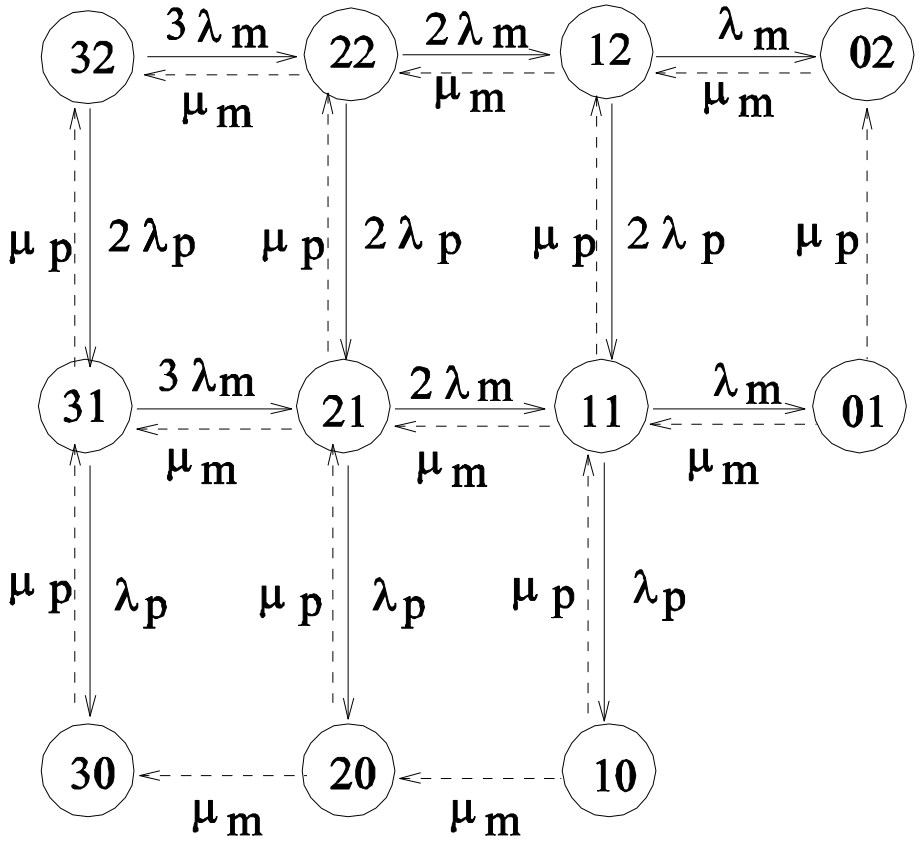
(3, 2) -> (2,2) after a memory fault

(3,0), (2,0), (1,0), (0,2), (0,1) are absorbent states

Availability modeling

- Assume that faulty components are replaced and we evaluate the probability that the system is operational at time t
- Constant repair rate μ (number of expected repairs in a unit of time)
- Strategy of repair:
  only one processor or one memory at a time can be substituted

Markov chain modelling the 2 processors and 3 shared memories system with repair.



λm failure rate for memory
λp failure rate for processor
μm repair rate for memory
μp repair rate for processor

- Strategy of repair:

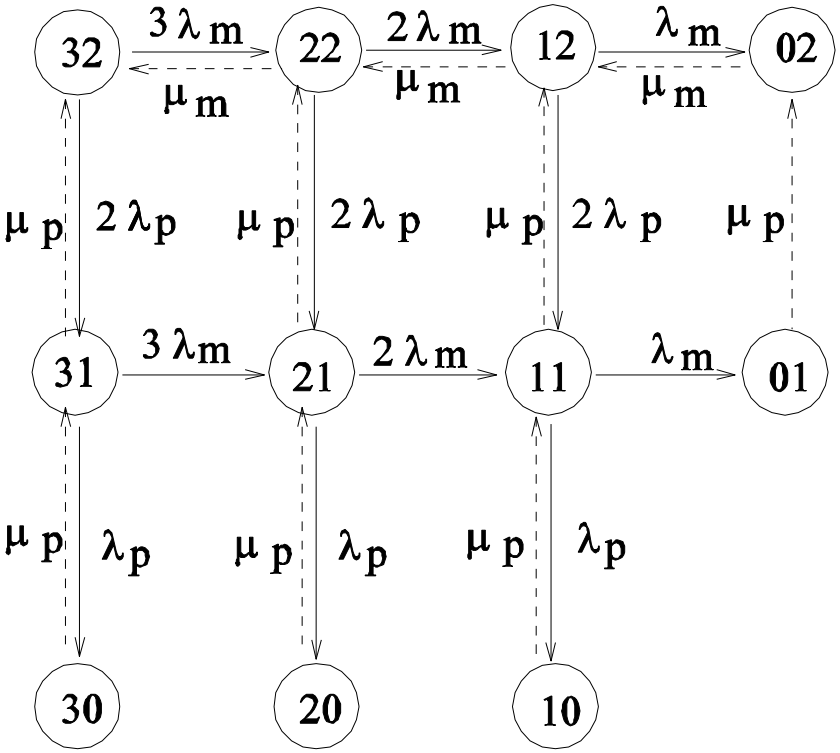
  only one component can be substituted at a time

  processor higher priority

- Strategy of repair:

  only one component can be substituted at a time

  processor higher priority



exclude the lines μm representing memory repair in the case where there has been a process failure