Block diagrams can be expanded to lower level diagrams using expandable blocks (see Section 5.1.6).

5.1.1.2 Weighted Block Diagram

A weighted block diagram represents a system consisting of a number of components. Each component contributes to the system availability or reliability with a certain probability, or *weight*. For a weighted block diagram, the diagram level availability (reliability), *A*, is calculated by

$$A = W1*A1 + W2*A2 + ... + Wn*An$$

where *Wi* and *Ai* represent the weight and availability for component *i*.

In a weighted block diagram, each block represents a component. Blocks are connected by links in series, like a serial block diagram. To distinguish with the reliability block diagram, a link connecting two weighted blocks has a small circle at the center of the link. A weighted block diagram must have at least two block, exactly two terminals and links to connect between blocks and terminals. An example of weighted block diagram is shown in Figure 25 where λ, μ, and w represent failure rate, recovery rate, and weight, respectively.
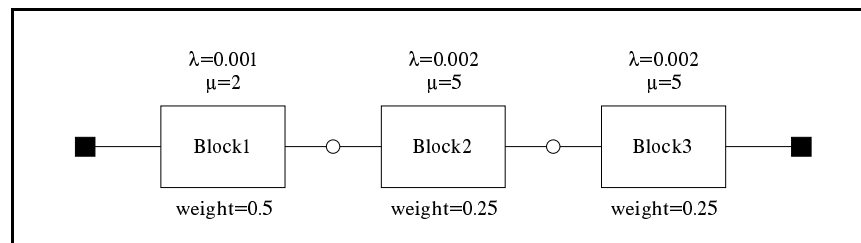

Figure 25 A Weighted Block Diagram

5.1.1.3 K-out-of-n Block Model

A k-out-of-n model is a model in which *k* out of the *n* components in the modeled system must operate for the system to operate properly. A "k-out-of-n" model can only be set to a non-elemental block (which has a sub-diagram). There are two integer parameters associated with a k-out-of-n block: *k* and *n*. To set a block to the k-out-of-n model, just run the Set k-out-of-n Block command under the Options menu (see Section 5.1.13). You will be asked for the *n* and *k* values for the block. Note that *k* should not be greater than *n*.

5.1.2   Markov Chain Diagram

A Markov model consists of system states and transitions from one state to another. A system state represents a combination of both operational and failed components in the system. The system stays in a state for a random time, defined by an exponential distribution, and then goes into another state. A transition from one state to another state