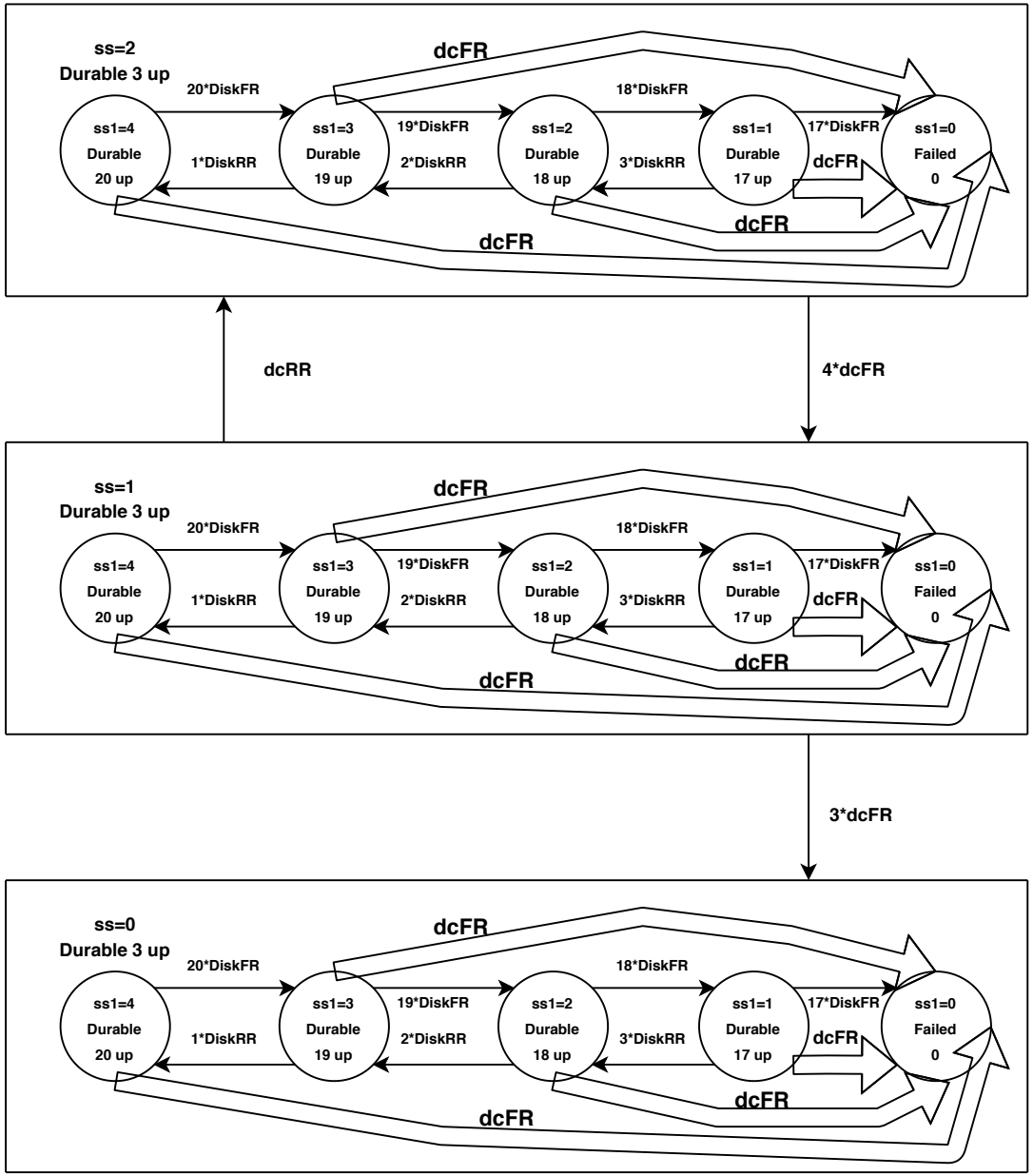

Cold-Storage Model

System Modeling:

I modeled the system by following the model of a single data center with 17/20 coding-disks with repairs and ¾ coding-disks with repairs.

Here, I first modeled a single data center with 17/20 coding disks with repair model where ss1 is denoting the states of the disks. Here, ss1 = 4 means 20 disks are up and ss1= 0 means less than 17 disks are up. We start at disk ss1 = 4.

Then I defined the 3 data centers by following ¾ coding-disks with repairs model. Here, ss is denoting the data centers. Hence, maximum 1 data center failure is allowed that's why I allowed the data center ss = 2 to be repairable in case of failure from ss = 1. Here we start at ss = 2.

Interpretation of Results:

1. 1d1d: Result 99.99999996721508
2. 1d1w: Result 99.99999977429107
3. 1w1d: Result 99.99999996721508
4. 1w1w: Result 99.99999977429118

Here, it was obvious that by repairing the disks and the data center in daily basis we will ensure the highest probability of data survival in cold storage for one year.

We got approximately seven 9's durability for 1d1d. But surprisingly, we also got the same result for 1w1d. From 1d1w & 1w1w, we got six 9's of durability. Therefore, we can say that as 1d1d & 1w1d both provides the same result, we should choose 1w1d where disks will be repaired weekly and data center will be repaired in daily basis. In this way we will ensure the maximum durability while minimizing the costs.