Much work has been done looking at CD4+ Memory T cells, our research isolates the individual events that occur to CD4+ T cells throughout an immune response. Memory CD4+ T cells are the cells that orchestrate a response to a pathogen upon re-challenge, and the memory T cell repertoire is created during primary and subsequent infections or through vaccination. Understanding this generation can lead to better developments of vaccines and a greater understanding of immune responses to infections. We generate a Discrete Event Branching Process to represent the events that occur during the development of the CD4+ T cell lineage. We are looking to understand the probability distributions associated with each step that occurs over the course of development, and then determine the variation from traditional deterministic models. We then use Python to run simulations to track a CD4+ T cell throughout an immune response over a 400 hour interval, receiving constant antigenic stimulation. We track over each time step the number of naive CD4+ T cells, effector CD4+ T cells, Memory CD4+ T cells, and total CD4+ T cell count. We then perform a sensitivity analysis of estimated parameters to understand the influence they have on our system. Our simulation yields results to show the variation from deterministic curves of an immune response along with overlaying the curves determined by the mean of all trials and plus or minus one standard deviation, and we also calculate the mean number of mitoses a cell will have before undergoing apoptosis, which supports the observation of different responses to the same pathogen in different individuals, and can be used to understand the parameters that exist when considering treatments to pathogens such as vaccine development.