We nevertheless consider an alternative approach to define the dynamic of nodes leaving the work queue and joining the worker pool that both prevents Sybil attack and incentivise nodes to join the work queue during periods of low demand for work. We define a ranking (or score) associated to each node in the work queue. The ranking given to a node joining the work queue is not purely chronological-based. It also depends on the volume of nodes joining the queue during same allotted time period. Assume S_t nodes wanting to join the worker queue during a small window of time $[t, t+\Delta t]$. The S_t nodes first register to a tertiary queue DHT_s. At the end of the time window, a fixed and limited number of nodes from DHT_s, $z \leq S_t$, are randomly selected. z is equal to the number of nodes who left the worker pool during the time window $[t-\Delta t, t]$. These z nodes are given a ranking drawn from a normal distribution centred around R_q, which is a predetermined threshold of the worker queue length. This means that some selected nodes may obtain a ranking higher than nodes currently at the bottom of the worker queue. The rest of the nodes in the tertiary queue $(S_t - z)$ are given a ranking drawn from a normal distribution centred around $R_l = R_q - s$, where s is a shift inversely proportional to the volume of nodes in the tertiary queue DHT_s. Figure 1 illustrates the process of ranking allocation for nodes joining the worker queue.

In the example given in the figure below, for time t, $z = 3$ as this is the number of nodes that leave DHT_w at the end of the time period t. z can thereby be represented by A, B and C which move into DHT_q with a normal score at $t + \Delta t$. D therefore is in the remaining nodes in $S_t - z$ that enter DHT_q with a low score. z for the time period $t + \Delta t$ is 5 as this is the number of nodes that leave DHT_w at the end of the time period $t + \Delta t$. Thereby 5 nodes will join DHT_q with a high score at time $t + 2\Delta t$.

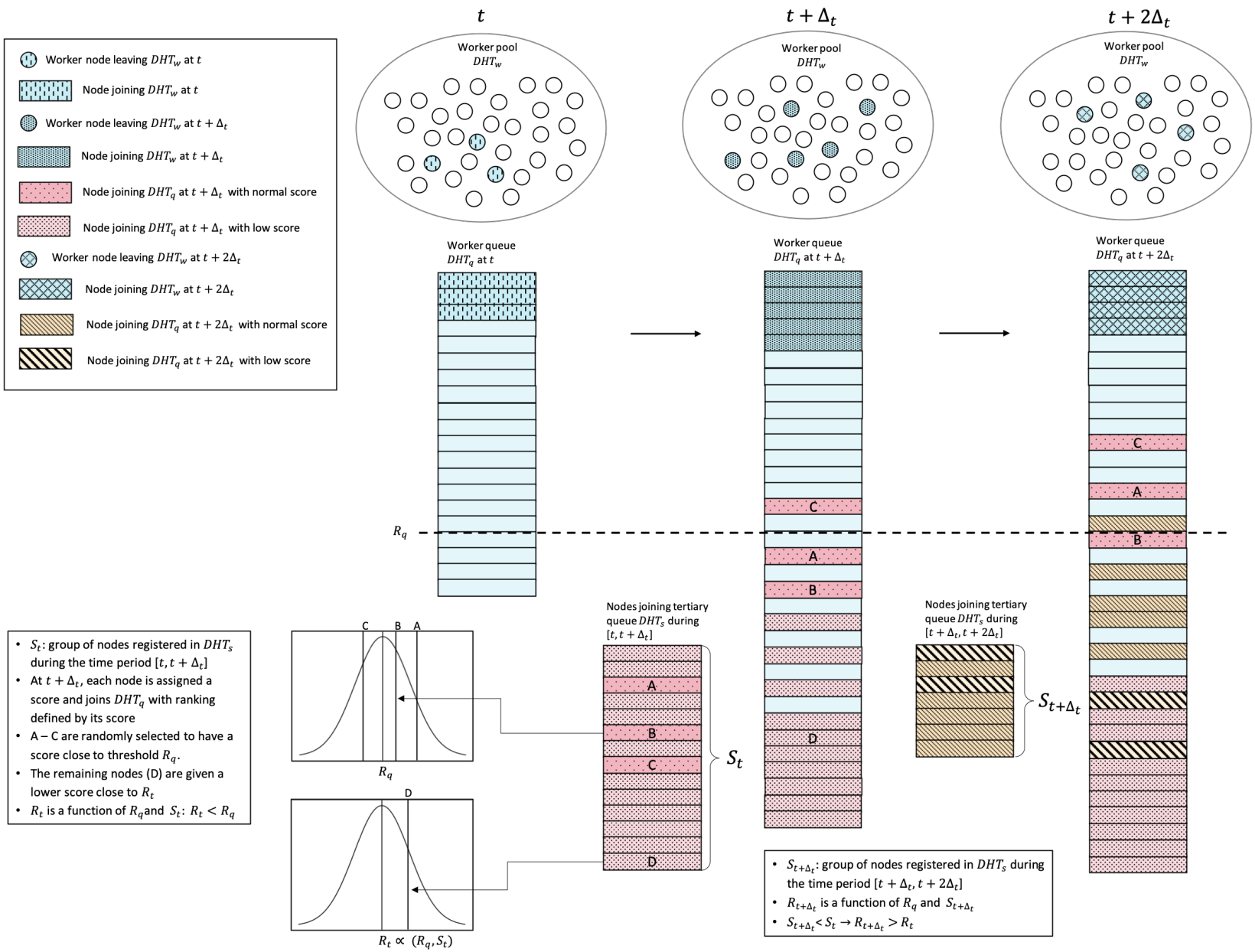

Figure 1: Illustration of the process followed by Catalyst network to add nodes to the work queue.