Code Jam 2015 - Round 2

Analysis: Kiddie Pool

While the pool is being filled, each source of water is turned on for some fraction of the time. This is equivalent to having each source turned on for the whole time at a fixed rate which is between zero and $\mathbf{R}_i$. So the problem is to find what rate each source should be set to in order to maximize the total flow and get the correct temperature. Then the fill time is the capacity of the pool divided by the total flow rate.

Find the temperature of the water we get when setting each source's rate to the maximum. If the temperature is exactly the desired temperature, then we have the solution.

If the temperature is too hot, then we need to lower the temperature by lowering the flow rate of some of the sources. To lower the total flow by as little as possible, we decrease flow starting with the hottest source, moving to the cooler sources if necessary, until the average temperature of the flowing water equals the desired temperature. If we never reach the desired temperature, then no solution was possible.

If the temperature is too low when all the sources are set to their maximum rate, then the solution is similar — we raise the temperature by reducing the flow rate of sources, starting from the coldest source.