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COMP9101 (T2-2020)
Homework 3 – Q3

First, traverse the timetable schedule of arrivals and departures to count how many trains arrive before midnight and depart after midnight. Record this value as C, which is the platforms needed at the beginning of the day (12:00 am).

Second, form a list of the arrivals and departures times with labels. For instance, the elements in this list could be “1:20am - departure”, “8:00 am - arrival”, “8:15 am - departure”, “11:55pm - arrive”, etc. Sort this list in an increasing sequence of times. Note that if there are several sequences that have the same time, always put the departure time sequences ahead the arrival time sequences.

Third, initialise value P as the value of C, which records the maximum value of C. Go through the list. During each iteration, if the sequence is an arrival time, add C by one. Since a train comes, we need to assign a platform for it. Then compare C with P, if $C > P$, assign the value of C to P. Otherwise, if the sequence is a departure time, deduct C by one. Since a train leaves, we can release a platform. Therefore, our problem is solved, the prove is as follows:

Since that we update C in each iteration according to the sequence type, it always represents the number of trains that currently stopping in the station, which as well as the minimum number of platforms we needed at that time. The value P, as the maximum value of C, satisfy train stoppings at any time.

Finally, the minimum number of platforms required is P.