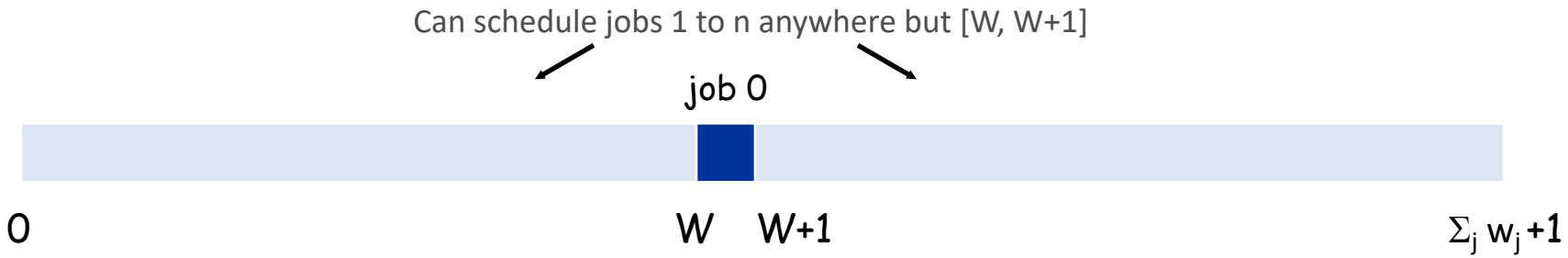
Scheduling With Release Times

- SCHEDULE-RELEASE-TIMES. Given a set of n jobs with processing time t_i, release time r_i, and deadline d_i, is it possible to schedule all jobs on a single machine such that job i is processed with a contiguous slot of t_i time units in the interval $[r_i, d_i]$ between release time and deadline?

- Claim. SUBSET-SUM $\leq_P$ SCHEDULE-RELEASE-TIMES.
- Reduction. Given an instance of SUBSET-SUM $w_1, \ldots, w_n$, and target W,
  - Create n jobs with processing time $t_i = w_i$, release time $r_i = 0$, and deadline $d_i = 1 + \sum_j w_j$.
  - Create job 0 with $t_0 = 1$, release time $r_0 = W$, and deadline $d_0 = W+1$.



to get a feasible schedule have to be able partition the jobs exactly into 2 chunks, one of W and the other of $(\sum_j w_j - W)$ processing time.