Lecture 28-29 (Oct 18-21)

- Consider an algorithm for the load balancing problem where we go over jobs in an arbitrary order and assign each job to the processor which currently has the minimum load.

  Find an example, where the makespan given by this algorithm is roughly twice of the optimal makespan.

- For a graph, a set S of vertices is called a vertex cover if every edge in the graph has at least one endpoint in S. An interesting optimization problem is to find an optimal vertex cover in a given graph, that is, with minimum number of vertices. Here is an algorithm to compute a vertex cover.

  0. Initialize S to be an empty set.

  1. Pick an arbitrary edge (u, v). Include both u and v in the set S.

  2. Delete (u, v) and all the edges which are incident on either u or v.

  3. If the graph has some edges remaining, go to 1.

  4. Output S as the vertex cover.

  We want to show that this is a 2-approximation algorithm. A natural lower bound which can be useful: for any matching M (a set of edges where no two edges share an endpoint), $|M|$ is a lower bound on optimal vertex cover.