ADA Final Challenge 2020

Team31

- l slices
- n jobs
- The i-th job
  - possesses m_i operations
  - has the weight of w_i
- The j-th operation of the i-th job
  - requires $s_{i,j}$ slices
  - requires the duration of $d_{i,j}$
  - depends on the operation $a_{i,j,k}$ for $k = 1, ..., p_{i,j}$

- $x_{i,j}$ is the integer start time of j-th operation of i-th job
- $y_{i,j,q}$ is equal to 1 if operation (i, j) is assigned to q-th slice
- $z_{i_1,j_1,i_2,j_2,q}$ is equal to 1 if operation (i_1, j_1) precedes operation (i_2, j_2) on q-th slice
- $V = \sum_i \sum_j d_{i,j}$
- $D_{i_1,j_1,i_2,j_2,q} = 2 - y_{i_1,j_1,q} - y_{i_2,j_2,q} + z_{i_1,j_1,i_2,j_2,q}$
- $\overline{D}_{i_1,j_1,i_2,j_2,q} = 3 - y_{i_1,j_1,q} - y_{i_2,j_2,q} - z_{i_1,j_1,i_2,j_2,q}$

$$\min \quad C_{max} + \sum_i w_i C_i \tag{1}$$

$$\text{s.t.} \quad x_{i,j} \geq 0, \qquad \forall(1 \leq i \leq n)\forall(1 \leq j \leq m_i) \tag{2}$$

$$x_{i,j} \geq x_{i,a_{i,j,k}} + d_{i,a_{i,j,k}}, \qquad \forall(1 \leq i \leq n)\forall(1 \leq j \leq m_i)\forall(1 \leq k \leq p_{i,j}) \tag{3}$$

$$x_{i_1,j_1} \geq x_{i_2,j_2} + d_{i_2,j_2} - V \cdot D_{i_1,j_1,i_2,j_2,q}, \qquad \forall(i_1, j_1)\forall(i_2, j_2)\forall(1 \leq q \leq l) \tag{4}$$

$$x_{i_2,j_2} \geq x_{i_1,j_1} + d_{i_1,j_1} - V \cdot \overline{D}_{i_1,j_1,i_2,j_2,q}, \qquad \forall(i_1, j_1)\forall(i_2, j_2)\forall(1 \leq q \leq l) \tag{5}$$

$$\sum_q y_{i,j,q} \geq s_{i,j}, \qquad \forall(1 \leq i \leq n)\forall(1 \leq j \leq m_i) \tag{6}$$

$$C_i \geq x_{i,j} + d_{i,j}, \qquad \forall(1 \leq i \leq n)\forall(1 \leq j \leq m_i) \tag{7}$$

$$C_{max} \geq C_i, \qquad \forall(1 \leq i \leq n) \tag{8}$$

$$y_{i,j,q} \in \{0, 1\}, \qquad \forall(1 \leq i \leq n)\forall(1 \leq j \leq m_i)\forall(1 \leq q \leq l) \tag{9}$$

$$z_{i_1,j_1,i_2,j_2,q} \in \{0, 1\}, \qquad \forall(i_1, j_1)\forall(i_2, j_2)\forall(1 \leq q \leq l) \tag{10}$$