We give the details of an ILP (Integer Linear Programming) model for an unrestricted scheduler for moldable streaming tasks with frequency scaling. The model proposed in the document is not linear, as the last equation of page 87

\[ \forall m \in P \quad t_m = M - \sum_{j \in T, k \in F} x_{j,m,k} \cdot (o_j - s_j) \]

multiplies the variables \( x_{j,m,k} \) and \( o_j - s_j \) together, for task \( j \), core \( m \) and frequency level \( k \). The paragraph below gives a correction to the wrong text portion in the original document, with the corrected linear equation as well as the updated rest of the section. The implementation we used to generate the results shown in Sec. 5.7.2 of the original document is not affected by this error and the results are therefore still valid.

Until now we did not take into account the idle energy. To consider the idle time for an active core \( m \), we need to mark cores that do not run any task as unused. We set the binary variable \( u_m \) to 0 if core \( m \) is unused and to 1 otherwise:

\[ \forall j \in T, m \in P, k \in F \quad u_m \geq x_{j,m,k}. \]

Then, we can compute the total idle time by deducting the sum of processing time for each task using as many cores allocated to run it in variable \( z \), from the total time and number of processors available (\( p \cdot M \)). We further deduct unused cores for the complete duration of the pipeline stage. We obtain the total idle time for the whole schedule:

\[ t_{idle} = p \cdot M - \sum_{j \in T, q \in 1..p, k \in F} z_{j,q,k} \frac{\tau_j}{F_k} \cdot e_{j,q} - M \cdot \sum_{m \in P} (1 - u_m) \]

and the total energy consumption results in:

\[ E = \sum_{q=1}^{p} \sum_{j \in T, k \in F} \tau_j \cdot \frac{P(F_k)}{F_k \cdot e_l(q)} + t_{idle} \cdot P_{idle}. \]