Warehouse Packaging Scheduling

ALC 21/22 - Project 1 Report - Group 5

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Running Instructions

Our project was developed using Python and PySat (which must be installed), and PySat's Glucose4 solver. Our code is in the directory /src/. To run the project from the main directory, simply type:

```
>>> python /src/project.py < instance_path.wps > res.out
```

Encoding

- X_{ijk} : Runner i places product j in the conveyor belt at time k.
- A_{ik} : Runner i is actively working at time k.
- P_{jk} : Product j arrives at the packaging area at time k.

Constraints

We implemented the following constraints:

1. A runner cannot spend less than 50% of the max timespan amongst other runners.
2. Runners start at time 0 in product j and never take breaks.
3. If a runner goes from product i to product j at time k, then it does not carry any other product in times]k, k+Tij[.
4. All products from all orders must arrive at the packaging area.
5. Only one product can arrive at the packaging area at a time.
6. A runner takes Tij time to go from product i to product j.
7. A product takes Cj time from the conveyor belt to the packaging area.
8. A runner can only carry one product at a time.
9. A product arrives at the packaging area if it was placed by one and only one runner.

Optimal Time Search

We perform a binary search to find the optimal timespan of operations. First, we calculate a lower and upper bound of what that time may be, according to the problem description. Then we perform a binary search among the possible optimal times, running the solver at each step until we find the smallest operation's time that satisfies all constraints.