

**Условие задачи:**

[**https://github.com/dostavista/phystech**](https://github.com/dostavista/phystech)

**5. Общие советы от организаторов**

1. Внимательно прочтите условие задачи **несколько раз**.
2. Задайте вопросы в чате задачи **и** лично экспертам.
3. Потратьте время на брейншторм и генерацию креативных идей.
4. Реализуйте минимальный функционал отвечающий одному из требований задачи.
5. Зафиксируйте успех.
6. По возможности расширьте функционал.

**Чат по задаче с экспертами и представителями компании:**

<https://t-do.ru/joinchat/FgVVhU0OBf4Mwb01gu3ybA>

**Общий чат хакатона:**

[**https://t-do.ru/joinchat/CivC-heKZrh1Wy0C7wXe3Q**](https://t-do.ru/joinchat/CivC-heKZrh1Wy0C7wXe3Q)

Успехов!

*Команда Phystech.Genesis*

**Background:** DostaVista (DV) is a courier service which manages 10,000s of independent couriers in 11 countries to deliver packages efficiently and on time. Being a technology company, most of its efficiency comes from sophisticated algorithms and the application of data analysis.

Today you are going to work on an experimental algorithm, which distributes 2-point orders (only lightweight packages, <1kg) between walking couriers in Moscow. The fun part comes from the ability of couriers to exchange packages in meeting points.

We ask you to maximize a **total service profit per day**. Total company's daily profit is a sum of daily profits from each courier.

Cost of 1 courier’s working hour = 240 RRUB.

Each courier's daily profit is a diff between the sum of his (completed) orders and 240\*(count of his working hours + time to reach the first point)

**Couriers’ behavior assumptions:**

1. Each courier is assigned to a metro station and can travel no further than 10 km away from it.
2. Couriers’ are available 24/7. You can assign orders to then during the whole day.
3. Each courier spends 10 minutes at each point.

**Input format:** you will be provided with the **list of orders** from 00:01 to 23:59, a **list of couriers** with their initial locations and a **list of meeting points**.

**Orders**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| order\_id | pickup\_time\_from | pickup\_time\_to | pickup\_point\_id | pickup\_address | pickup\_long | pickup\_lati | dropoff\_time\_from | dropoff\_time\_to | dropoff\_point\_id | dropoff\_address | dropoff\_long | dropoff\_lati | payment |

**Couriers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| courier\_id | point\_id | address | long | lati |

**Meeting points**

|  |  |  |  |
| --- | --- | --- | --- |
| point\_id | address | long | lati |

**Output format**

|  |  |  |  |
| --- | --- | --- | --- |
| сourier\_id | point\_id | order\_id | action |
|  |  |  | pickup OR dropoff |

**Requirements:**

Each courier’s route you calculate has to pass the following validations:

a. “Feasibility” – the courier has no more than 5 packages simultaneously, no package is picked up / delivered twice, point\_id matches orders\_id

b. “On time” – each courier can come to pick up and delivery points on time, as requested by the client; validator assumes courier either comes at the beginning of time window or as early as possible

c. “Execution Excellence” – means every assigned order is executed and no package is left at the meeting point by the end of the day

d. “No debt” – meaning no courier has unfinished orders by the end of the day

**Example task and solution:**

**Orders**

|  |  |  |  |
| --- | --- | --- | --- |
| **order\_id** | 1 | 2 | 3 |
| **pickup\_time\_from** | 10:00 | 11:00 | 15:00 |
| **pickup\_time\_to** | 11:00 | 12:00 | 17:00 |
| **pickup\_point\_id** | p1 | p1 | p3 |
| **pickup\_address** | Тихвинская 12 | Тихвинская 12 | Дербеневская набережная 7с10 |
| **pickup\_long** | TBD | TBD | TBD |
| **pickup\_lati** | TBD | TBD | TBD |
| **dropoff\_time\_from** | 13:00 | 13:00 | 15:00 |
| **dropoff\_time\_to** | 17:00 | 17:00 | 17:00 |
| **dropoff\_point\_id** | p2 | p3 | p4 |
| **dropoff\_address** | Кантемировская 53 | Дербеневская набережная 7с10 | Тверская, 10 |
| **dropoff\_long** | TBD | TBD | TBD |
| **dropoff\_lati** | TBD | TBD | TBD |
| **payment** | 500 | 1000 | 600 |

**Couriers**

|  |  |  |
| --- | --- | --- |
| **courier\_id** | c1 | c2 |
| **point\_id** | p100 | p101 |
| **address** | Новослободская | Павелецкая |
| **long** | TBD | TBD |
| **lati** | TBD | TBD |

**Meeting points**

|  |  |  |
| --- | --- | --- |
| **point\_id** | m2 | m3 |
| **address** | Кантемировская | Павелецкая |
| **long** | TBD | TBD |
| **lati** | TBD | TBD |

**Example solution**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **courier\_id** | **point\_id** | **order\_id** | **action** | **ETA** | **comment** |
| c1 | p1 | 1 | pickup | 10:00 | arrived by the beginning of pickup window |
| c1 | p1 | 2 | pickup | 10:10 | spent 10 minutes at the first point, moved to the next one. +10 minutes at the second point |
| c1 | p3 | 3 | pickup | 15:00 | arrived by the beginning of pickup window. still could come earlier, by 11:00. |
| c1 | p3 | 2 | dropoff | 15:10 | dropped of package 2. spent 10 min at the previous point. is going to leave at 15:20 |
| c1 | m3 | 3 | dropoff | 15:40 | 20 min walk from previous point to meeting point. leaving at 15:40. |
| c1 | p2 | 1 | dropoff | 16:30 | 40 min rider from previous point. dropped of package 1. finished the day. |
| c2 | m3 | 3 | pickup | 15:40 | earliest time courier can take the package |
| c2 | p4 | 3 | dropoff | 16:20 | dropped of package 3. finished the day |

Total revenue: 500 (order 1) + 1000 (order 2) + 600 (order 3) = 2100 RRUB

Total cost:

* Courier 1: worked from 10:00 to 16:30 + 30 min to get to first point -> 7 working hours -> 7 \* 240 RRUB = 1680 RRUB
* Courier 2: worked from 15:40 to 16:20 + 30 min to get to first point -> 70 min -> 70/60 \* 240 = 280 RRUB

Total cost: 1680 + 280 = 1960 RRUB

**Total profit: 2100 - 1960 = 140 RRUB**

/orders - отдать заказ за следующие "5 минут"

/assignOrder - назначать заказы на курьеров в симуляторе

/auth - получить токен доступа к системе

/start - перезапустить автомат