Level 3

Glados:

Too easy for you, eh? Let's give you some real aliens for you to deal with.

The easiest way to prepare is in an enclosed environment - a controlled simulation. Given a list of aliens and their movement plans, give their exact coordinates at any point in time.

Task for Level 3:

Simulate alien movement speed and predict location at each point in time

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- › Aliens will move according to the movement plans they have established. The cells they move through are the ones we've discovered in the previous task
- › Our spies have found out that there are **multiple** types of aliens
- › Each type has multiple characteristics but for now we are only interested in their speed
- › Each simulation will focus on **one type**. Its **speed** will be in the input
- › Because of their hive-swarm mentality, aliens move sequentially, in so called "ticks". Every alien moves a fixed distance each tick, depending on its speed. Thus, the **tick** becomes a very important *unit of time*.

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› Speed will be a float value. Each tick the alien will move a number of cells according to its speed value. Turns are instant, they take no time

› **While we guarantee that there will be no floating point precision errors for our values, it's better to use higher precision where possible!**

› Example:
  › F 1 T 1 F 5
  › Speed = 1.0
    › Tick 0: Alien will be in the initial cell, cell 0
    › Tick 1: Alien will be in cell 1
    › ...
    › Tick x: Alien will be in cell x
  › Speed = 0.5
    › Tick 0: Alien will be in cell 0
    › Tick 1: Alien will be in cell 0
    › Tick 2: Alien will be in cell **1**
    › Tick 3: Alien will be in cell **1**
  › Speed = 0.67
    › Tick 0: Alien will be in cell 0
    › Tick 1: Alien will be in cell 0
    › Tick 2: Alien will be in cell **1**
    › Tick 3: Alien will be in cell **2**

› Speed = 2
  › Tick 0: Alien will be in cell 0
  › Tick 1: Alien will be in cell 2
  › Tick 2: Alien will be in cell **4**
  › Tick 3: Alien will be in cell **6**

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› Our spies have also found out that not all aliens will attack at once

› The spawn time is a positive integer representing the tick in which the alien appears on cell 0 and starts moving

› Example:
  › Alien with speed 1.0 and spawn time 2
    › Tick 0: not spawned
    › Tick 1: not spawned
    › Tick 2: cell 0
    › Tick 3: cell 1
    › …

› **Each alien has a separate spawn time!** (not necessarily unique)

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› In order to test your simulations are correct we are going to ask you some queries

› Each query will consist of a tick and an *Alien_id* of an already spawned alien and will require you to respond with the rounded down cell coordinates of the alien with that id at the end of specified tick

› **Alien_id** is assigned in the order that they appear in the input and **it starts at 0**

› The simulation will contain **N** aliens and **Q** queries given in the input
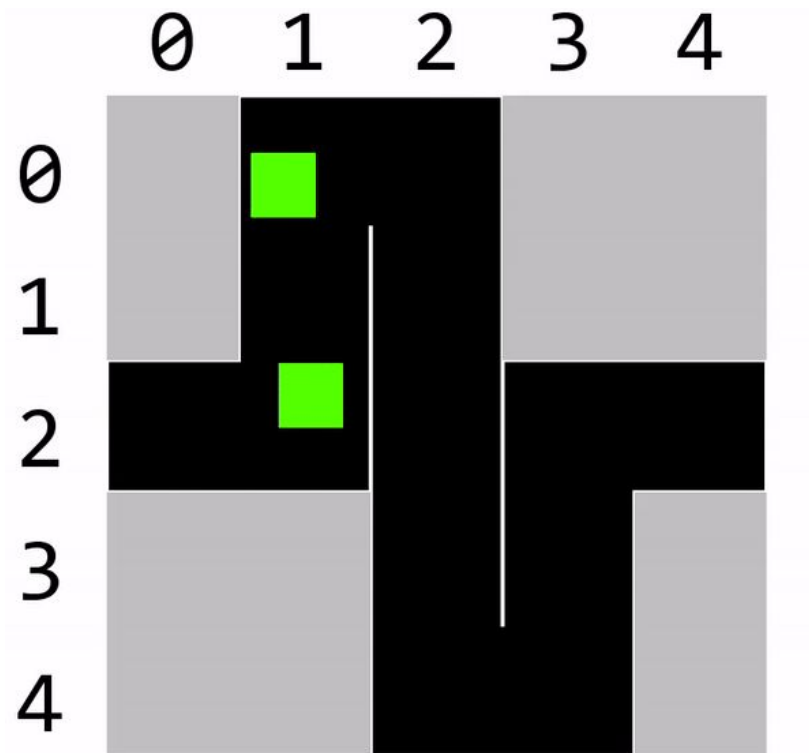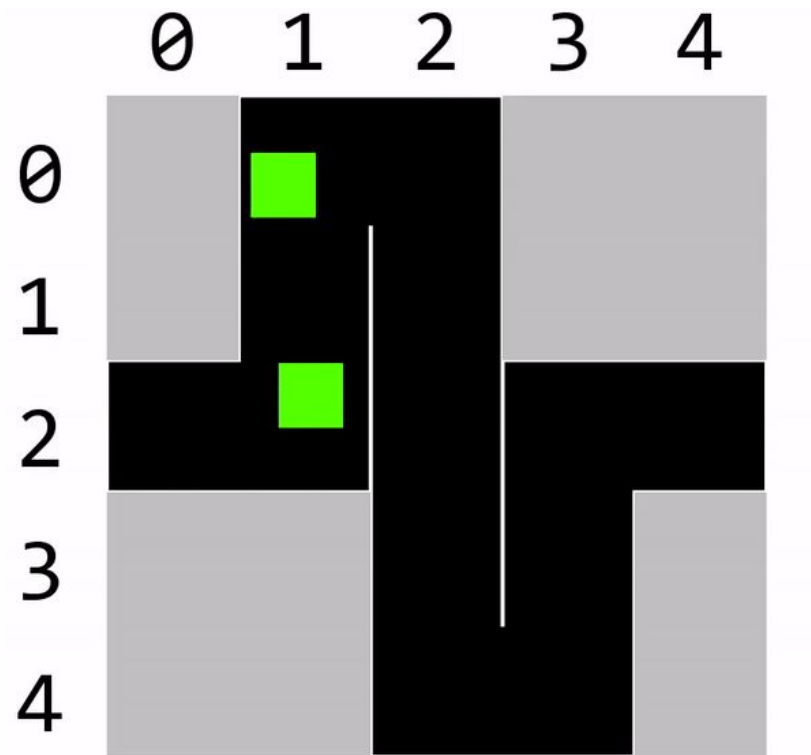
Input format:

<WX> <WY>

<X> <Y>

<Movement_Sequence>

<Speed>

<N>

<SpawnTime>

... ⎤ **N times**

<SpawnTime>

<Q>

<Time> <ID>

... ⎤ **Q times**

<Time> <ID>

*Click to see animated version

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Example:

5 5
0 2
F 1 T 3 F 2 T 1 F 1 T 1 F 4 T 3 F 1 T 3 F 2 T 1 F 1
1.0   -> aliens have a speed of 1.0
2   -> there will be 2 aliens
2   -> alien with **id 0** spawns at tick 2
0   -> alien with **id 1** spawns at tick 0
5   -> 5 queries
9 0   -> where is alien 0 **after** tick 9
2 0
9 1
12 0
10 1

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Output format:

<Time> <ID> <X> <Y>

...
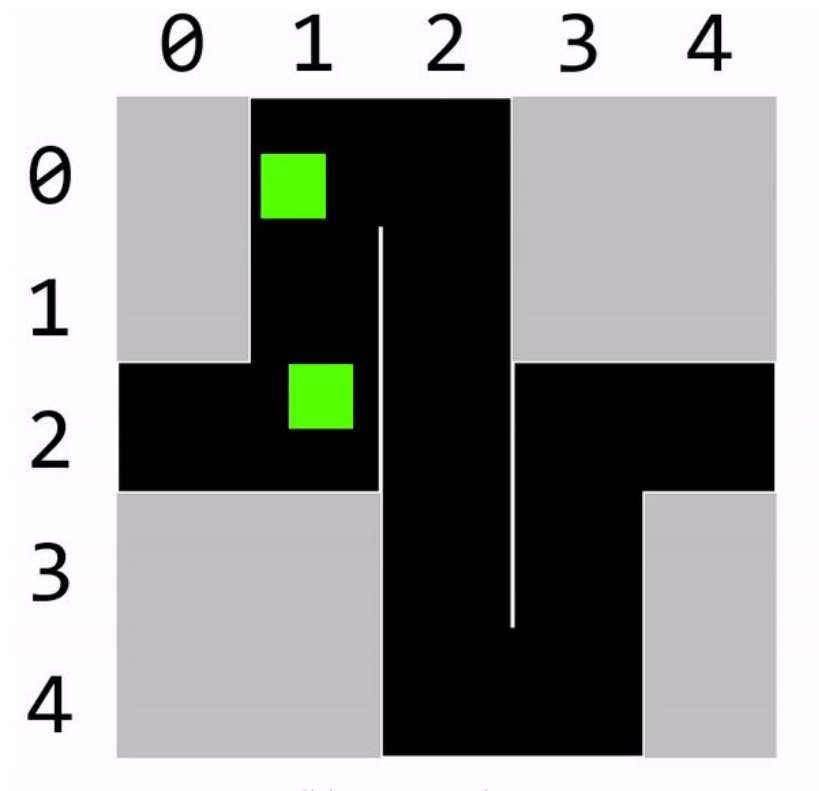
<Time> <ID> <X> <Y>

Q times

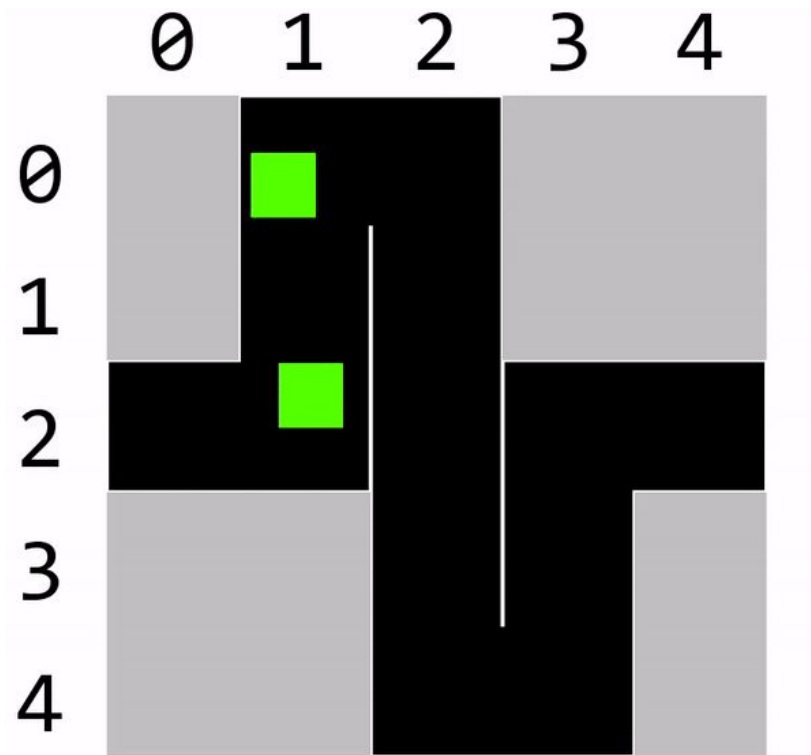The answers will be in the same order as the queries

*Click to see animated version

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Example:

9 0 2 3   -> alien 0 after tick 9 is at **x = 2 y = 3**
2 0 0 2
9 1 3 4
12 0 3 3
10 1 3 3

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Let's also look at an example with a faster speed:

5 5	
0 2	
F 1 T 3 F 2 T 1 F 1 T 1 F 4 T 3 F 1 T 3 F 2 T 1 F 1	
2.0	
1	
2	
5	
7 0	
5 0	
4 0	
8 0	
9 0	

Output:

7 0 3 3
5 0 2 2
4 0 2 0
8 0 4 2
9 0 4 2

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