

Star Dust

It's the year 2599, and the universe as we know it is under siege by space insects that call themselves stardust and unless the menace is brought under control, the human race is soon looking at extinction.

You happen to be one of the brave earth warriors that have taken the responsibility on your shoulders to teach the intruders a lesson. You have oiled up your space ship, loaded your space guns, kissed your family good back promising that you will return victoriously, ignited your antimatter drives and blasted off from earth in search of trouble. Only time and code will tell if you succeed at taming the menace at hand.

[Interview Tip] Objective of the exercise is to understand how you break down the problem, divide and conquer and not only the output.

The players:

1. **You in your spaceship are the protagonists (hero).** As you kill more and more stardust insects, your spaceship can get upgrades thus making you further efficient at killing bader and bader stardust insects. There is just one of you!
2. **The stardust insects are the antagonists (villians).** These insects come in **4 different levels** with different amour capabilities. L1 stardust insects just require one bullet impact to knock them off, L2 insects require 2 bullet impacts to knock them off, L3 insects require 3 bullet impacts to knock them off, L4 bullets require 4 bullet impacts to knock them off.
3. The min battle field size is **width x height (width \geq 8, height \geq 8)**, and the number of stardust insects the board starts with can be computed using the formula **(width - 2) * 2** allocated in a random pattern that occupies the top three rows of the battle ground. E.g if we have a battle size of 8 * 8, the number of insects to start with is $(8-2) * 2 = 12$. **See Fig #1 for random patterns that are valid (there can be more, these are just examples)**
4. The initial set of insects consists of all levels and occur in proportion **4:3:2:1 (L1:L2:L3:L4)**

Rules of battle:

1. The **battlefield is a coordinate system** as shown. **You and the spaceship start at the bottom of the board. Fig #1**
2. Star Dust insects swarm at the top of the board (never move down), move in a synchronous pattern and bounce off the edges. **Fig. 2**
3. **Your objective** is to use the gun attached to your space ship to shoot down the stardust insects.
4. When the game starts, you are a novice stardust assassin and you can only shoot one bullet at a time and bullets from your gun have an impact factor of 1. The bullet moves up the board in **h ticks (height of the battle board - one tick is equal to the bullet moving through one cell in the board)**. Your gun is locked till the bullet is obliterated.
5. Normal bullets obliterate when they either hit the absolute top of the battle board or when they hit a star dust insect. You start with normal bullets. **If your bullets hit the absolute top of the battle board you take health damage. Your spaceship explodes if the top of the battle field receives 10 bullet impact points.**
6. **With every tick, the swarm of stardust insects move from side to side (offset by one cell a tick).** The entire swarm's direction changes when any one of the insects hits the left or right edges of the battle board. See diagrams below for more visual explanations.
7. **Your guns upgrade with continuous hits and you land on the stardust swarm. Your guns also downgrade if your bullets miss the swarm.** Upgrades follow the following pattern. Guns have no upper limits on upgrades but have a min impact of 1 (in case of downgrades). E.g. if you land 4 continuous hits starting from base, your gun would have impact 3 and if you land 4 continuous misses starting from base, your gun would still have an impact of 1. The math is incremental and follows the table below.

Continuous Hits	Impact upgrade	Continuous Misses	Impact Downgrade
1	0	1	0
2	+1	2	-1
3	0	3	-1
4	+1	4	-1
$n \% 2 == 1$	0	$n \% 2 == 1$	-1
$n \% 2 == 0$	+1	$n \% 2 == 0$	-1

8. A player playing the game can move the starship left or right (not considered as a tick - the swarm moves only once the bullet is fired and enters the battlefield). **Fig #3**
9. A player can also fire a bullet from his gun using the input key B. A bullet enters the battle board as soon as it is fired and the bullet starts from the cell just above the user's spaceship. **Fig #3 - Tick 0**
10. The **game ends** when either **your spaceship explodes** or **all the stardust insects are destroyed**.
11. You have to display your current gun damage impact, number of stardust insects by level alive and your current health (starts with 10) as part of the battle board.
12. **Output colors and graphics are only representative. Just write a CLI that can output a n*n grid filled with characters of choice to denote intent.**

Illustrations and Diagrams

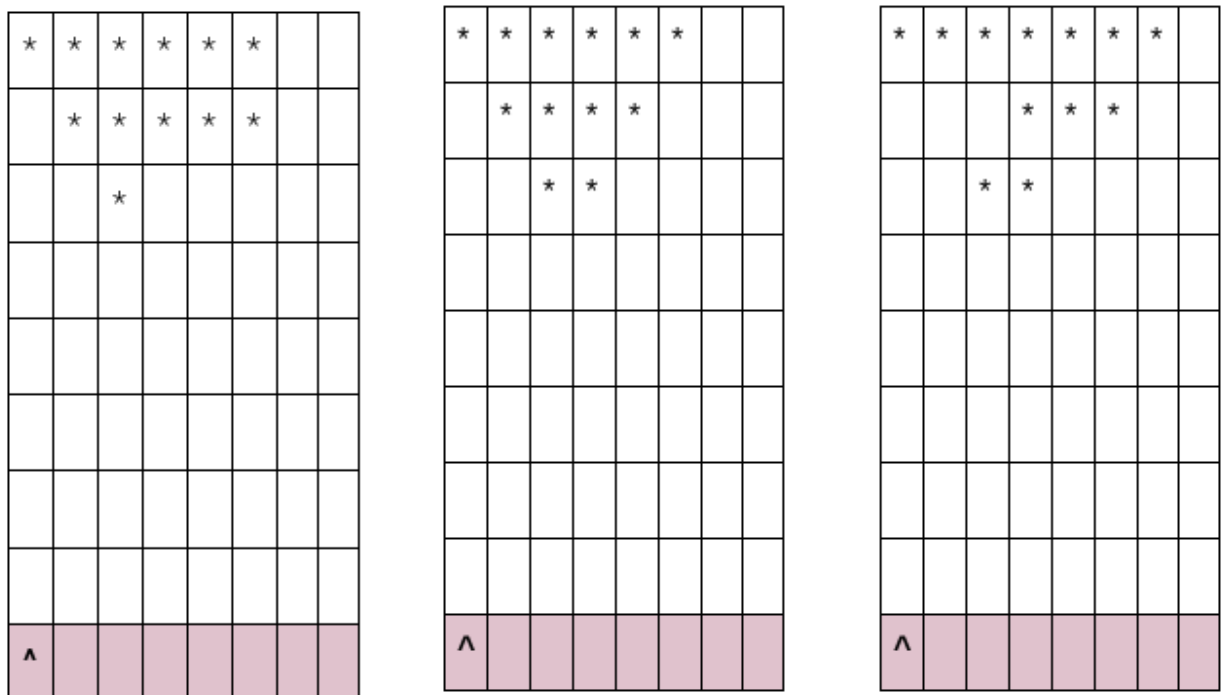


Fig 1. Battle Grounds Some valid samples for initial battle fields (You generate at random and start with either one). There should always be a gap on one side so that the swarm can move from left to right and vice versa.

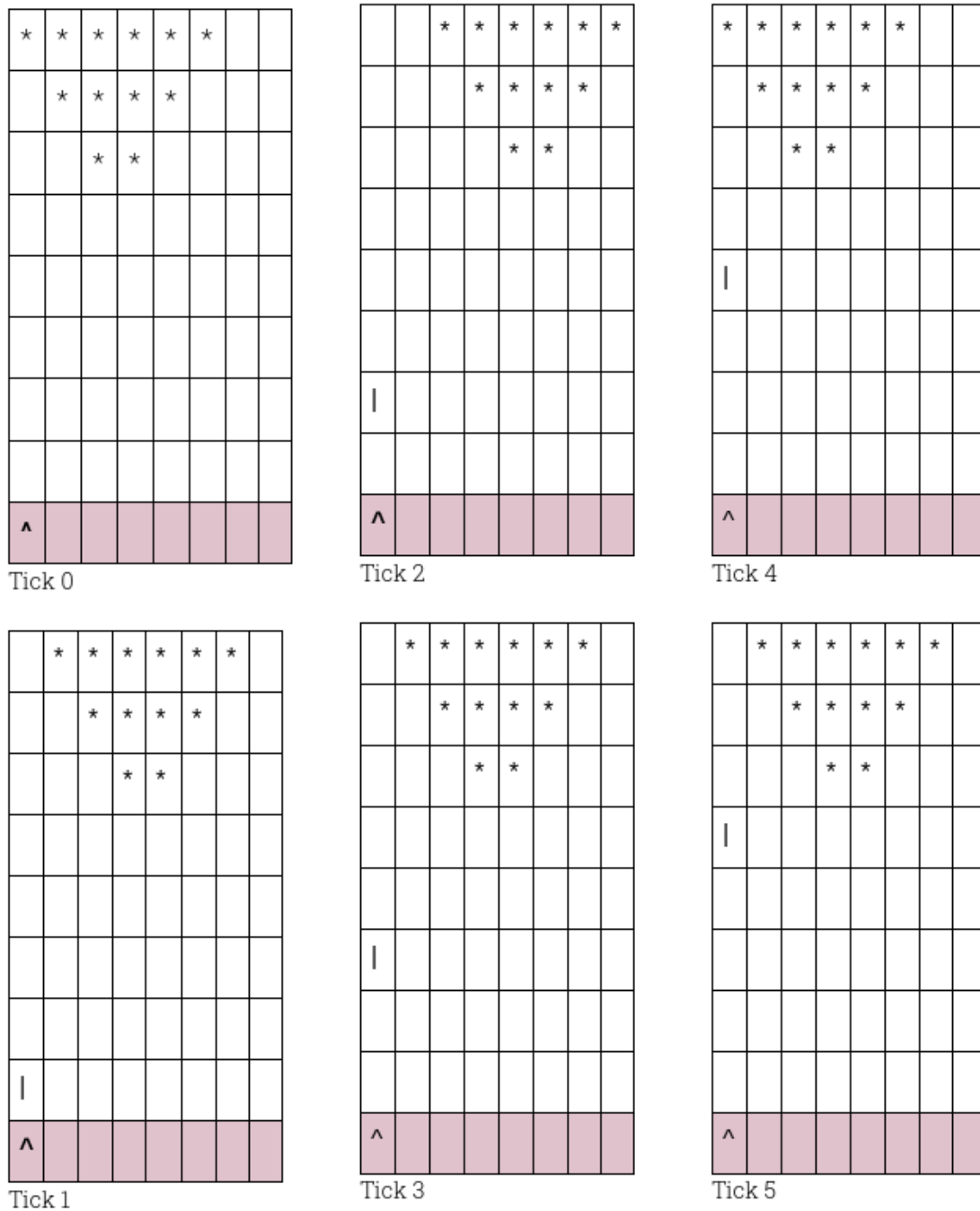


Fig 2. Ticks and Swarm oscillations. Tracks the path of a bullet once fired from the user's space gun. With every cell the bullet travels through, the swarm moves. Initial movement is to the left and then to the right on a bounce off the right edge of the battle field.

Swarm - L1 * 7, L2 * 3, L3 * 1, L4 *1, You: 10

	*	2	*	4	*	2	
		*	3	*	2		
			*	*			
A							

Select: L to move left, R to move right, B to fire >

Fig 3. Summaries and actions. Swarm tenants and user health to be shown at the top of every output stage. Level information about the swarm can be shown in the grid itself. * denotes L1

★	★	★	★	★	★		
	★	★	★	★			
		★	★				
▲							

1. Action: R

*	*	*	*	*	*		
	*	*	*	*			
		*	*				
	A						

2. Action: L

*	*	*	*	*	*		
	*	*	*	*			
		*	*				
▲							

3. Action F

	*	*	*	*	*	*
		*	*	*	*	
			*	*		
I						
^						

4. Tick 1

Fig 4. User actions (aiming) + Firing. Read in order 1,2,3,4.

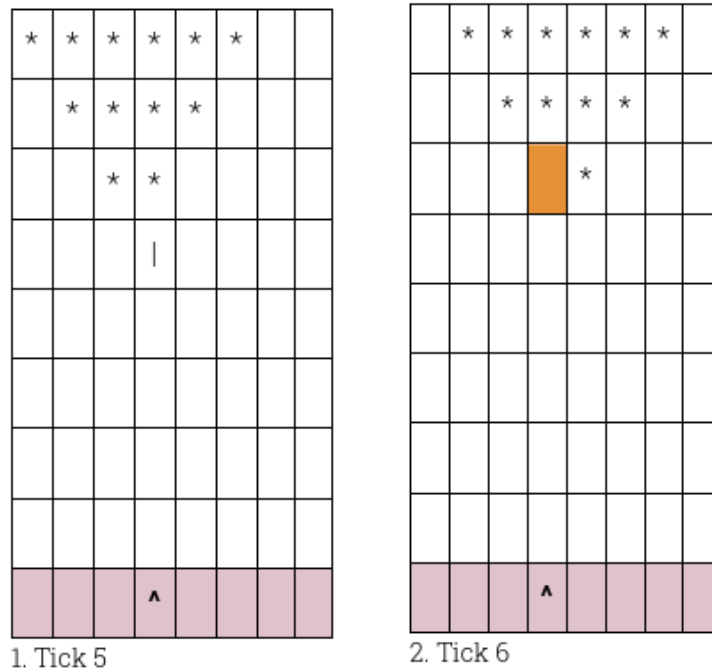


Fig 5. Bullet hits target. Color is representative and is not required.

Swarm - L1 * 12, You: 10

Swarm - L1 * 12, You: 9

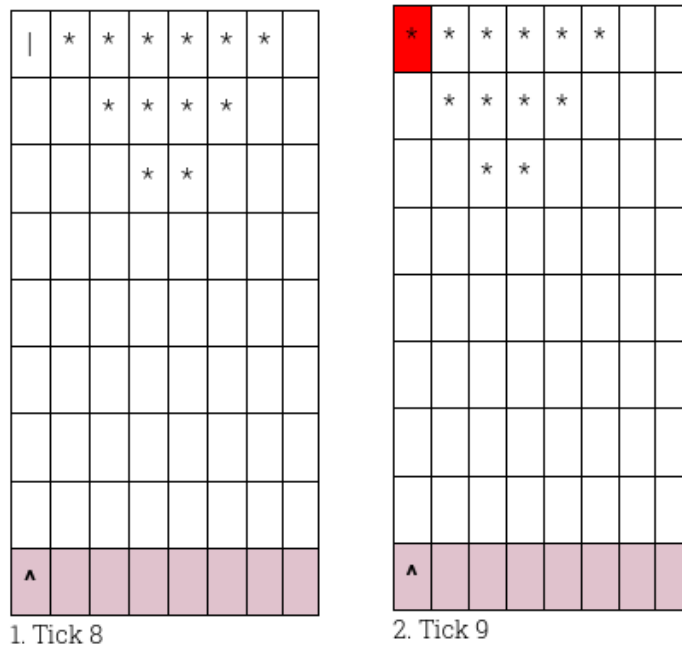


Fig 6. Bullet hits the top of the battlefield, the user loses health. Color is representative and is not required.