Good Level Up
Development Summer Internship Case Study

In our studio, we consider our technical team as the center of a healthy game. Most likely to a heart in a body, it should be healthy, efficient and enables the rest of the team to create great things. We are looking for new friends to join our game development team to create the best games together.

In this case study, we are asking you to design and implement a game featuring a collapse/blast mechanic. Our primary focus is on **performance**, with an emphasis on optimizing **memory**, **CPU**, and **GPU** usage.

Collapse / Blast mechanic is a type of tile matching game mechanic. In these games, the player is expected to find groups of the same colored blocks and by tapping/clicking on these groups the player removes those blocks from the board. The vacant cells will then be filled with the stacked blocks above and newly created blocks as well.

The **minimum** number of same colored blocks to create a collapsible / blastable group is **2**. Total number of colors **(K)** in a game can be varied between **1 to 6**, all colors should have a different icon for easier recognition by the player. Board can have 2 to 10 rows **(M)** and 2 to 10 columns **(N)**. Extra blocks needed to fill vacant areas should be created at the outside of the board and drop from the top of the corresponding column.

Additionally, we want players to find bigger groups easier, therefore we want to have different icons on blocks based on the number of items in corresponding groups. In other words;

- All the blocks in a group should display default icons by default, if not changed by the following rules.
- If the group has more blocks than first condition**(A)** it should display **first** icon,
- If the group has more blocks than second condition**(B)** it should display **second** icon,
- If the group has more blocks than the third condition**(C)** it should display the **third** icon.

Occasionally this mechanic can create a deadlock situation due to lack of any collapsible / blastable group on the board. We want the game to detect these situations and implement a shuffling solution which doesn't rely on "blindly shuffle N times until deadlock is resolved".

You can find examples for the above definitions and rules at the end of the document.

Finally for better understanding of the collapse/blast mechanic and gameplay, you can play **Toon Blast, Lilly's Garden** or **Pet Rescue Saga** games. These games can be found on the AppStore on iOS or Play Store on Android mobile devices. We are expecting you to use Unity for this case study. You are free to use any 3rd party packages if necessary. You can share your project as a zip file (excluding the Library folder).

Example 1:

Let the rules be like following;

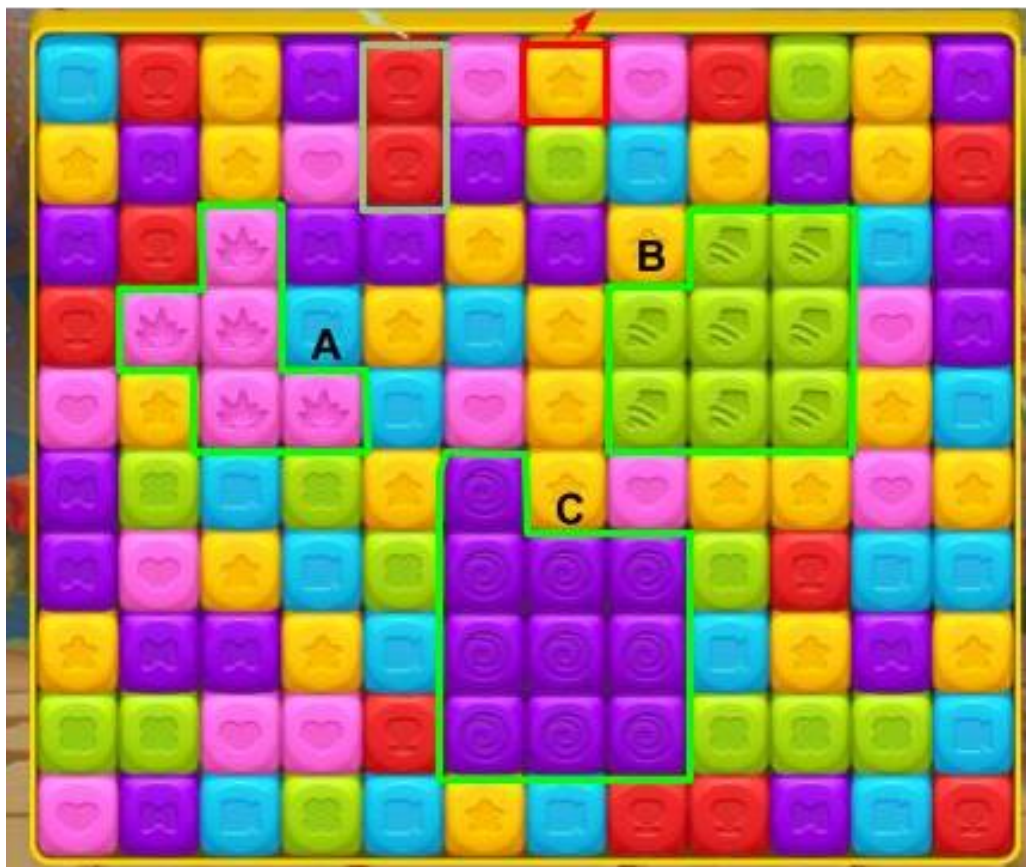- **M=10, N = 12, K=6, A=4, B=7, C=9**

Which means;

- The number of **rows** is **10**,
- The number of **columns** is **12**,
- The number of **colors** is **6**,
- if a group has **less than 5** (e.g. 1, 2, 3, 4) items it should display a **default icon** for that color.
- If a group has **more than 4** and **less than 8** (e.g. 5, 6, 7) items it should display **first icon**,If a group has **more than 7** and l**ess than 10** (e.g. 8, 9) items it should display **second icon**,
- If a group has **more than 10** items it should display **third icon**,

6 Colors

Example Board
blastable   not blastable

Example 2:

Let the rules be like following;

- **M=5, N = 8, K=4, A=4, B=6, C=8**

Which means;

- The number of **rows** is **5**,
- The number of **columns** is **8**,
- The number of **colors** is **4**,
- if a group has **less than 5** (e.g. 1, 2, 3, 4) items it should display a **default ico**n for that color.
- If a group has **more than 4** and **less than 7** (e.g. 5, 6,) items it should display **first icon**,If a group has **more than 6** and l**ess than 9** (e.g. 7, 8) items it should display **second icon**,
- If a group has **more than 8** items it should display **third icon**,

4 Colors

Board