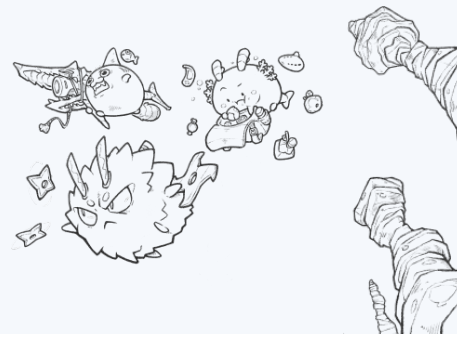# Back-end Engineer

TECHNICAL TEST

Part 1: Coding

Candidate can choose the language they're familiar with and should come up with their best solution in term of algorithm complexity.

Given a 2D array A of N*N integers. If an element in this array equal 1, set its entire row and column to 1 and return the modified array. Your code should use as less memory as possible.

Example

```
A = 0 1 2 3
    3 1 2 4
    1 0 2 3
    5 9 2 5
```

Return:

```
A = 1 1 1 1
    1 1 1 1
    1 1 1 1
    1 1 2 5
```

Part 2: System design

Design the architecture of the following system. Your solution should contain traffic estimation, tools/technologies to use, services and databases design, bottleneck discussion. You can make any assumptions to drive your solution. Choose one of the decisions in your design and explain why do you go with it rather than other alternative options.

Design an image recognition app (using camera to recognize the objects - table, dog, cat, human, etc).

Part 3: Real-world application

Implement the following web application and deploy to some hosting environment (e.g. Heroku). Submit the source code and URL to the application. You're free to add more backend or frontend features for bonus points. Your application should be written from scratch and use any languages/tools of your choice. The front-end can be very simple.

A web app to record the current IP and location of the browser. The app should display current visit's information (IP address, location, timezone...), the last 100 visitors, and also the top 100 IPs that visit the website the most.