**Step 1: Explain the technical problem you solved in this exercise**

In our first task, we have tested our Rydberg atom computer for the preparation of a 101010… state, so-called Z2 state. In a Rydberg atom quantum computer, the state is 0 if the atom is in its lowest-energy (default) state and 1 if one of the electrons assumes a highly excited state, almost leaving the atom. With the application of a laser field, the atoms prefer to be in this excited state, but at the same time two close excited states repel each other. Even though this task doesn’t have business applications yet, it is essential in understanding and controlling the quantum hardware. In the second task, we checked how big neutral-atom quantum processor in terms of qubits can be simulated on a classical device. Assuming certain restrictions that eliminate non-physical states allowed to further improve classical computing performance. The answer, which is in case of 1D arrays 17 qubits for our desktop PCs, suggests that a quantum advantage can be expected above these qubit numbers. For 2D problems, the advantage was shown to be above … .  
Finally, we managed to solve a Maximal Independent Set problem on this QPU, which looks for a configuration in a graph, where zeros are only neighboring with ones and vice versa. We applied this problem to solve DUGG, a special type of MIS.

## Step 2: Explain or provide examples of the types of real-world problems this solution can solve One example of a Maximal Independent Set is the antenna coverage problem. Given an area, and a range of an antenna, we should minimize the number of antennas, such that the whole area is within range of at least one antenna. Of course, setting two antennas close to each other should be penalized, because the overlap is costly. This problem maps in a straightforward way to the Rydberg atoms. In a similar fashion, a store chain might want to cover a given area with stores, without any two of them being too close to each other – this would cannibalize the other store’s revenue. When given a set of locations where the stores can be placed, we can quantify the location’s attractiveness by an expected profit, as well as distance to the other stores.

## Step 3: Identify at least one potential customer for this solution - ie: a business who has this problem and would consider paying to have this problem solved Europe: O2, Telekom, Vodafone USA: AT&T, Verizon