Bilkent University
Department of Mathematics

Problem Of The Month

Term: January 2024

There are several red and several white boxes on the table, each of these boxes contains at least one ball. A positive integer number not exceeding 1111 is written on each of these balls.

† Any two boxes contain different number of balls.

†† No box contains two balls with the same number.

††† For each $1 \leq i \leq 1111$ there is at most one red box containing ball number i.

†††† For each $1 \leq i \leq 1111$ there is at most one white box containing ball number i.

††††† For any two balls with numbers i and j, where $1 \leq i \leq 1111$, $1 \leq j \leq 1111$ and $i \neq j$ there is at most one box containing these two balls.

Find the maximal possible number of boxes on the table.