# 7 Room walk

Let us consider a $n \times n$ shaped room, with access door I located at cell $(1,1)$ and exit door O located at cell (n,n) (see picture, with $n = 6$).

The room can contain $1 \times k$ or $k \times 1$ walls. The allowed moves are either horizontal of vertical. The problem is to identify a (the) minimal length path from i to O. As tie breaking for length, less turns in the path are preferred. If necessary, you can solve the corresponding decision problem based on path length.
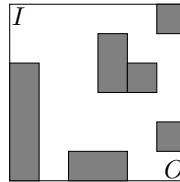
1. Write a Minizinc program capable of solving the problem. Work a bit on minizinc output for a nice printing of the solution.

2. Prepare a battery of benchmark instances in the following way. For $n = 6, 8, 10, 12, 14$ (or another sequence if instances are too easy or too difficult) generate randomly 5 different instances with n walls and 5 different instances with $2n$ walls (this can be done using any programming language). You should have 50 instances. Try also the (trivial) instances without walls.

3. Run your Minizinc encoding on all the instances, possibly exploring different search strategies, with a timeout of 5 minutes for each test ("configuration" option in Minizinc).

4. Write a 6–10 pages report containing your models (and the reasons for some choices) and a presentation of the execution results. Prepare the programs and the benchmark instances used in a unique zip file.