The Chinese University of Hong Kong
Department of Systems Engineering and Engineering Management

CSCI-2100-B Data Structures

2013-14 Assignment 1

The Mazing Problem

We have discussed the mazing problem in lecture-note `ch3.pptx` including the main ideas, the data structures to be used, the pseudo code, and an example. In this assignment, you are requested to write a `C` program by yourself, called `mymaze`.[1]
A maze will be represented in a two-dimensional array with C columns (`x`) and R rows (`y`). Following the example given in the slide of 3-9 in `ch3.pptx`, the array to represent a maze in this assignment is assumed to be as follows.

```
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 0 1 1 0 0 1 0 0 0 0 0 1 1 1 1
1 0 0 0 0 1 1 0 1 1 1 0 0 1 1 1
1 0 1 1 0 0 0 0 0 1 1 1 0 0 0 1
1 1 1 0 0 1 1 1 0 1 1 0 1 1 0 0
1 1 1 0 1 1 0 1 0 0 1 1 1 1 1 1
1 0 0 0 1 1 0 1 1 0 1 1 1 1 1 1
1 0 1 1 1 1 0 1 1 1 1 1 1 1 1 1
1 0 0 0 1 0 0 0 0 1 1 1 1 1 0 1
1 1 1 0 0 0 1 1 0 1 1 0 0 0 0 1
1 0 0 0 1 1 1 1 0 0 0 0 1 1 1 0
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

Here, `1`s and `0`s represent barriers and paths, respectively. As you can see, the surrounding is all barriers, which will make the coding easy. We also assume there are only **four** possible directions of movement: north, east, south, and west. (In the textbook, it considers all eight possible directions of movement: north, northeast, east, southeast, south, southwest, west, and northwest.)
Your program is supposed to be run as follows.

[1]Departmental Guideline for Plagiarism (Department of Systems Engineering and Engineering Management): If a student is found plagiarizing, his/her case will be reported to the Department Examination Panel. If the case is proven after deliberation, the student will automatically fail the course in which he/she committed plagiarism. The definition of plagiarism includes copying of the whole or parts of written assignments, programming exercises, reports, quiz papers, mid-term examinations and final examinations. The penalty will apply to both the one who copies the work and the one whose work is being copied, unless the latter can prove his/her work has been copied unwittingly. Furthermore, inclusion of others' works or results without citation in assignments and reports is also regarded as plagiarism with similar penalty to the offender. A student caught plagiarizing during tests or examinations will be reported to the Faculty office and appropriate disciplinary authorities for further action, in addition to failing the course.

Input: Your program is expected to read from standard input (keyboard) instead of any file, exactly as what you practiced in the previous Lab submissions. The input starts with a number N which denotes the total number of test cases to be followed. For each test case, it begins with two integers representing C (Column) and R (Row). We guarantee C and R are less than 100. In each of the R rows, each containing C characters (`E`, `X`, `1` or `0`), separated by a single space. Here, `0` and `1` represent path and barrier, respectively. `E` and `X` represent the entry point and the exit point, respectively, where the entry point and exit point should be treated as path. There will be exactly one `E` and one `X` in each test case.

An Input Example: An input example is given below.

```
2
4 3
1 1 1 1
1 E X 1
1 1 1 1
4 4
1 1 1 1
1 X 0 1
1 0 E 1
1 1 1 1
```

Output: Your program is expected to output to the standard output (screen). Your program must output N lines for the N test cases. If there is a path found for a case, then output a sequence of characters (without any space in between) from the entry to the exit. Here, each character must be one of `E` (east), `W` (west), `S` (south), and `N` (north), which represents a direction of movement. It is important to note that there may be multiple paths from the entry to the exit, as you can see from the second case in the input example above.

- **Note-1**: In your program, you are requested to try directions of movement in the following order: first `N`, `W`, `S`, and then last `E`.

If there is no path found for a case, output `No-answer`.

An Output Example: The output for the input example is given below.

```
E
NW
```

Marking: Your program will be judged solely on the correctness, i.e., the percentage of test cases that your program can successfully and correctly handle. We will also check your source code. A set of tests will be provided on the course website and eLearning. The set of tests provided is for your testing only, and it does not account for any mark. We will use a different set of tests for marking. We encourage you to submit your program even if you cannot pass the test on online judge, in order for you to receive marks it deserves.

Submission: In every source file you submit, you must include the following at the top. (Replace `<Your Full Name>` with your full name.)

```
/*
I, <Your Full Name>,  am submitting the assignment for
an individual project.

I declare that the assignment here submitted is original except for
source material explicitly acknowledged, the piece of work, or a part
of the piece of work has not been submitted for more than one purpose
(i.e. to satisfy the requirements in two different courses) without
declaration. I also acknowledge that I am aware of University policy
and regulations on honesty in academic work, and of the disciplinary
guidelines and procedures applicable to breaches of such policy and
regulations, as contained in the University website
http://www.cuhk.edu.hk/policy/academichonesty/.

It is also understood that assignments without a properly signed
declaration by the student concerned will not be graded by the
teacher(s).
*/
```

Submit your source file to to the Problem No. **1009** in the online judge for this course hosted at `http://sepc498.se.cuhk.edu.hk`. We will use your last submission, as the final submission, for testing.
The due date for the first assignment is 5:00pm, February 28, 2014. The late penalty will be 10% per day. A submission will not be accepted five days after the deadline.

Start working on it as soon as possible!