Hacettepe University
Department of Computer Engineering

BBM204 Programming Lab.
Assignment 1

Submission Date	**:**	**06/03/14**
Due Date	**:**	**21/03/14, 23:59 pm**
Advisor	**:**	**R.A Gültekin IŞIK, Dr. Mustafa EGE, Dr. Erkut ERDEM**
Programming Language	**:**	**C**

AIM

You're expected to implement a program that finds a solution path of the given mazes.

PROBLEM

Mazes have been an intriguing subject for many years. Experimental psychologists train rats to search mazes for food, and many a mystery novelist has used an English country garden maze as setting for a murder. We also interested in mazes since they present a nice application of stacks. You are going to develop a program that runs a maze. Although this program takes many false paths before it finds a correct one, once found it can correctly rerun the maze without taking any false paths.

In your program, the first issue that confronts us is the representation of the maze. The obvious choice is a two dimensional array in which zeros represents the open paths and ones the barriers. On the maze the capital letters denote **doors** and the small letters denote **keys** used for unlocking the doors. Same letters represent key-door peers (a > A, b > B). Your program needs to find a key to open the door. So, your program may find a key after the door or vice versa. You should specify at path.txt which key is found. Figure-2 shows a simple maze. You are expected to implement a program that finds a solution path. You should use these letters for moves: **E** for East, **W** for West, **N** for North and **S** for South. Your entry and exit points can be anywhere you want on the maze. The letters **S** is used for **Start**, and **E** for **Exit** (Our example shows that entry is at top left, exit is at bottom right). Let X marks the spot of our current location and then Figure-1 shows the possible moves from this position. So you have four directions of movements (except borders).

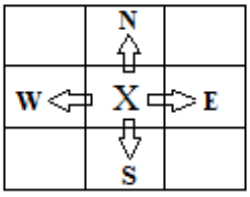

Figure-1: Allowable moves

Some important issues:

- Your program must find ALL possible solution paths.
- You must use stack while solving the problem. Stack size should be changed dynamically. In addition, usage of any other data structure is allowed.

INPUT:
Your program has one input file. Example “maze.txt” file is below. Several input files will be used to explore your application’s robustness level:

```
7 7
S 0 0 1 0 0 1
1 1 0 1 0 1 0
0 0 0 1 0 1 0
a 0 1 1 1 0 0
0 0 0 A 0 0 0
1 1 0 1 1 1 0
0 b 0 0 0 B E
```

Figure-2: maze.txt

OUTPUT:
After execution, output of the program is written to a file named “path.txt”. It contains one possible solution path of the maze (If there is no solution, it must be stated):

```
GO E
GO E
GO S
GO S
GO W
GO W
GO S
TAKE KEY a
GO S
GO E
GO E
GO E
OPEN DOOR A
GO E
GO E
GO E
GO S
GO S
```

Figure-3: path.txt

Paths look like this, respectively (just example to clarify how to move):

```
# # # . . . .
. . # . . . .
# # # . . . .
# . . . . . .
# # # > # # #
. . . . . . #
. . . . . . #
```

Key a found

REPORTS

Your reports must be PDF documents and adhere to the Hacettepe University Computer Science Department Report Writing Guidelines. Submissions with poorly written code can't be expected to receive a high score for the report. Here are some additional guidelines that will help you write your report for this experiment:

- Briefly explain what you understand from the problem.
- Provide a detailed description of your solution.
- Do not copy-paste from the experiment sheet.
- Show some moves visually.

NOTES:

- Regardless of the length, use understandable names to your variables, functions, etc.
- Write readable source code block.
- Save all your work until the experiment is graded.
- The assignment must be original, INDIVIDUAL work. Duplicate or very similar assignments are both going to be punished. General discussion of the problem is allowed, but DO NOT SHARE answers, algorithms or source codes.
- The experiment code will be tested on the dev machine. Your source code should be compiled with GCC. Otherwise your experiment will not be evaluated.
- You can ask your questions through https://piazza.com/hacettepe.edu.tr/spring2014/bbm202

SUBMISSIONS:

- Your submission will be in the format below:
  - report
    - report.pdf
  - source
    - maze.c

- You will use online submission system to submit your experiments. https://submit.cs.hacettepe.edu.tr Other submission methods (such as e-mail) will not be accepted.

- Do not submit any file via e-mail related with this assignment.