Problem D
Routing mode checking
Time limit: 5 seconds

The mesh-based Network-on-Chip (NoC) has been viewed as a practical solution for the inter-connection in the multi-core systems. The data communication among each core by following the predefined data delivering routing algorithms. The routing algorithm can be classified into XY routing algorithm and adaptive routing algorithm. The XY routing algorithm always transmits the data to the target core by following one x-axis direction delivery first and then one y-axis direction delivery, as shown in Figure 1(a). On the other hand, the adaptive routing algorithm provides more routing path diversity than the XY routing algorithm if each core in the minimal routing region is active, as shown in Figure 1(b). Therefore, each core in the minimal routing region is defined as the adaptive routable core. The minimal routing region is a rectangle region bounded by the source core and the destination core, as shown in Figure 1(b). However, some cores will become inactive core because of system reliability issue. In this case, some cores may become non-reachable cores for some source cores. Figure 1(c) illustrates an example to indicate the adopted routing mode (*i.e.,*XY routing algorithm or adaptive routing algorithm) for each core as identifying the source core.

Given the location of a source core and the 8-by-8 NoC topology status. Therefore, there are 64 cores in this NoC multi-core system. You need to find a way to decide the proper routing mode to deliver the data to every other reachable core. If the core is non-reachable core, you need to indicate it.
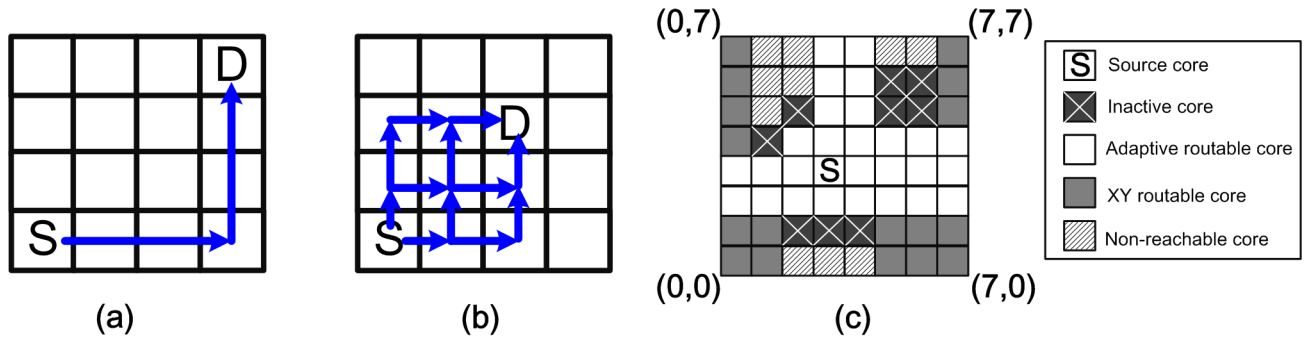

Figure 1: a)The XY routing algorithm ,(b)the adaptive routing algorithm, and (c)the example routing mode checking.

Input Format

An instance of the problem consists of 64 numbers. The first number represents the top left (0,7) core, the second number represents the (1,7) core, ,and the last number represents the

bottom right (7,0) core. If the number is 0, it is the inactive core. If the number is 1, it is the active core. If the number is 2, it is the source core. Note that the test data file may contain more than one instances. The last instance is followed by a line containing a single 0.

Output Format

The output must contains 64 numbers for each instance. The first number represents the top left (0,7) core, the second number represents the (1,7)core, ,and the last number represents the bottom right (7,0) core. If the number is 0, it is the adaptive routable core. If the number is 1, it is the XY-routable core. If the number is 2, it is the inactive core. If the number is 3, it is the non-reachable core. If the number is 4, it is the source core. If there are multiple states for a core, the priority is $4 > 2 > 0 > 1 > 3$.

Sample Input

0000000000000011000100110010000000002000000000000011100000000000
0

Sample Output for the Sample Input

1330033113300221132002211200000000040000000000001122211111333111