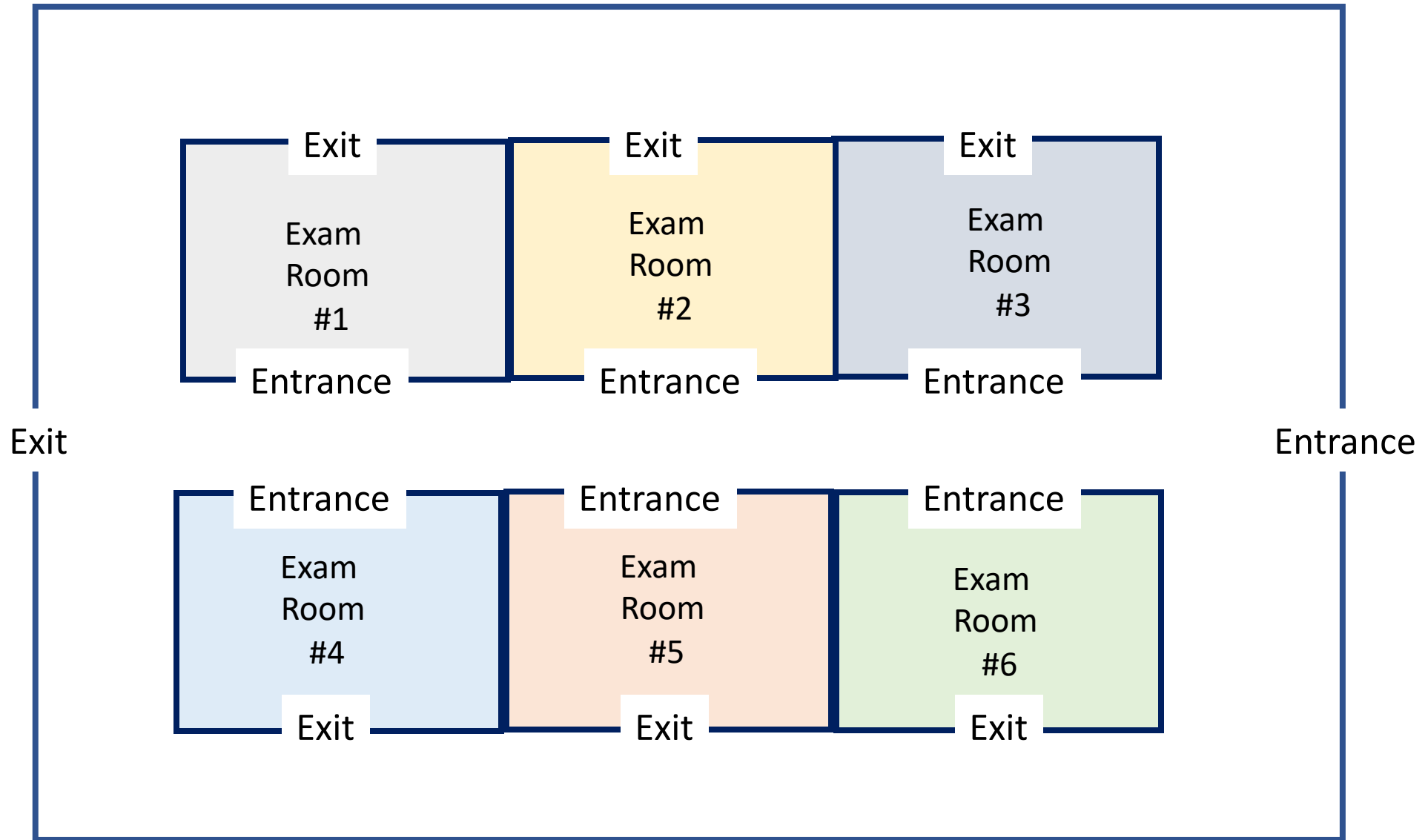
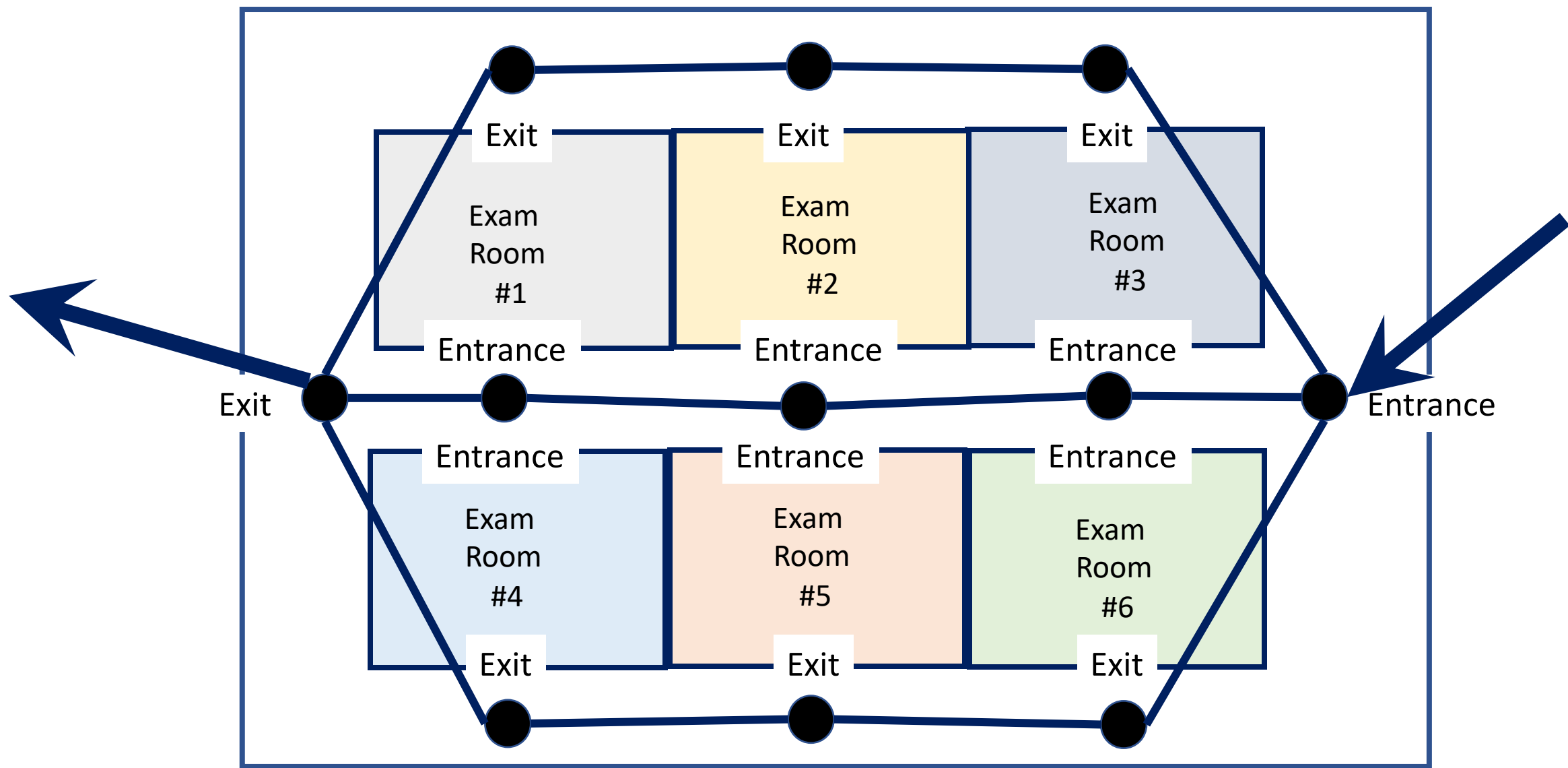
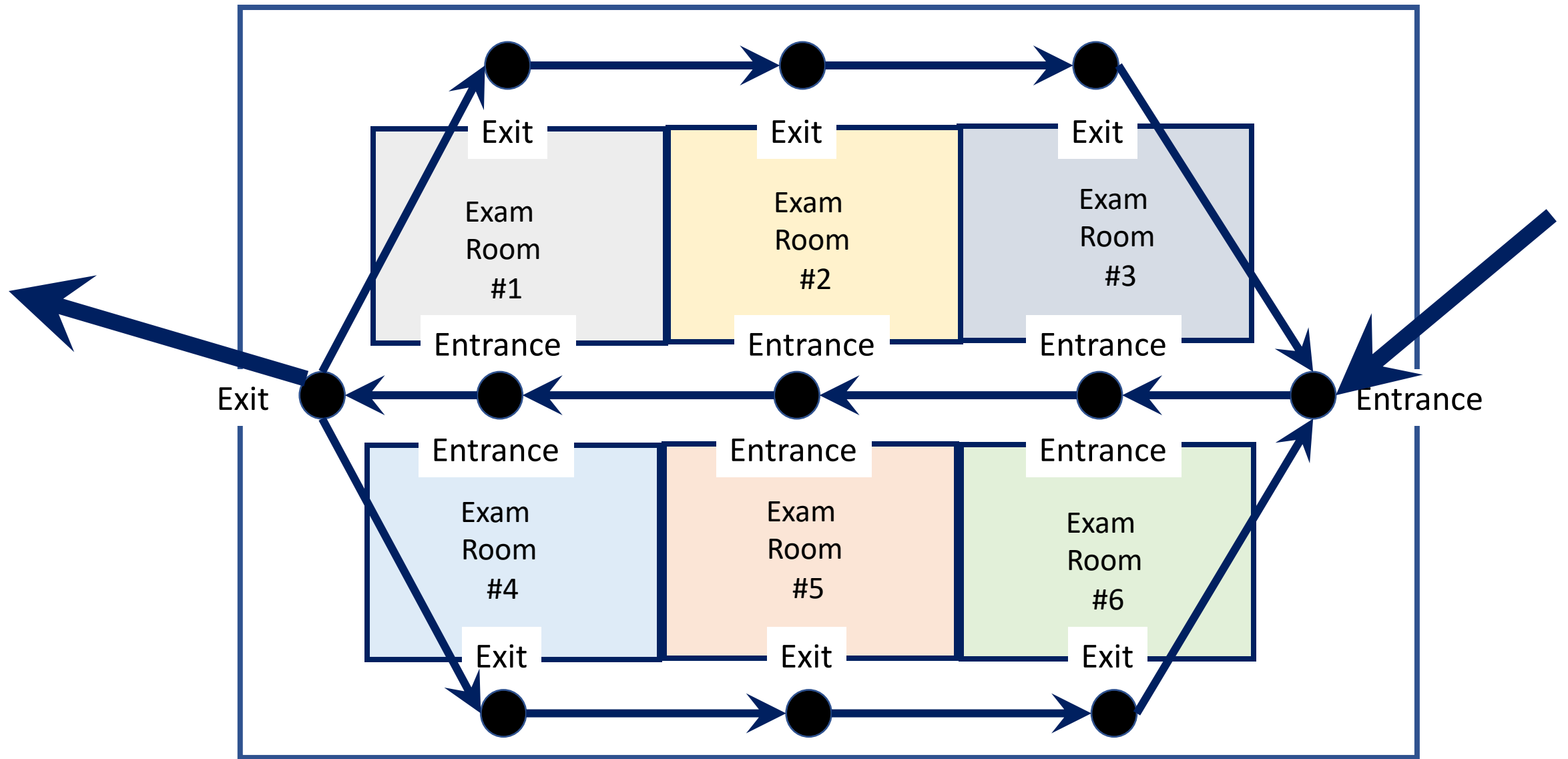


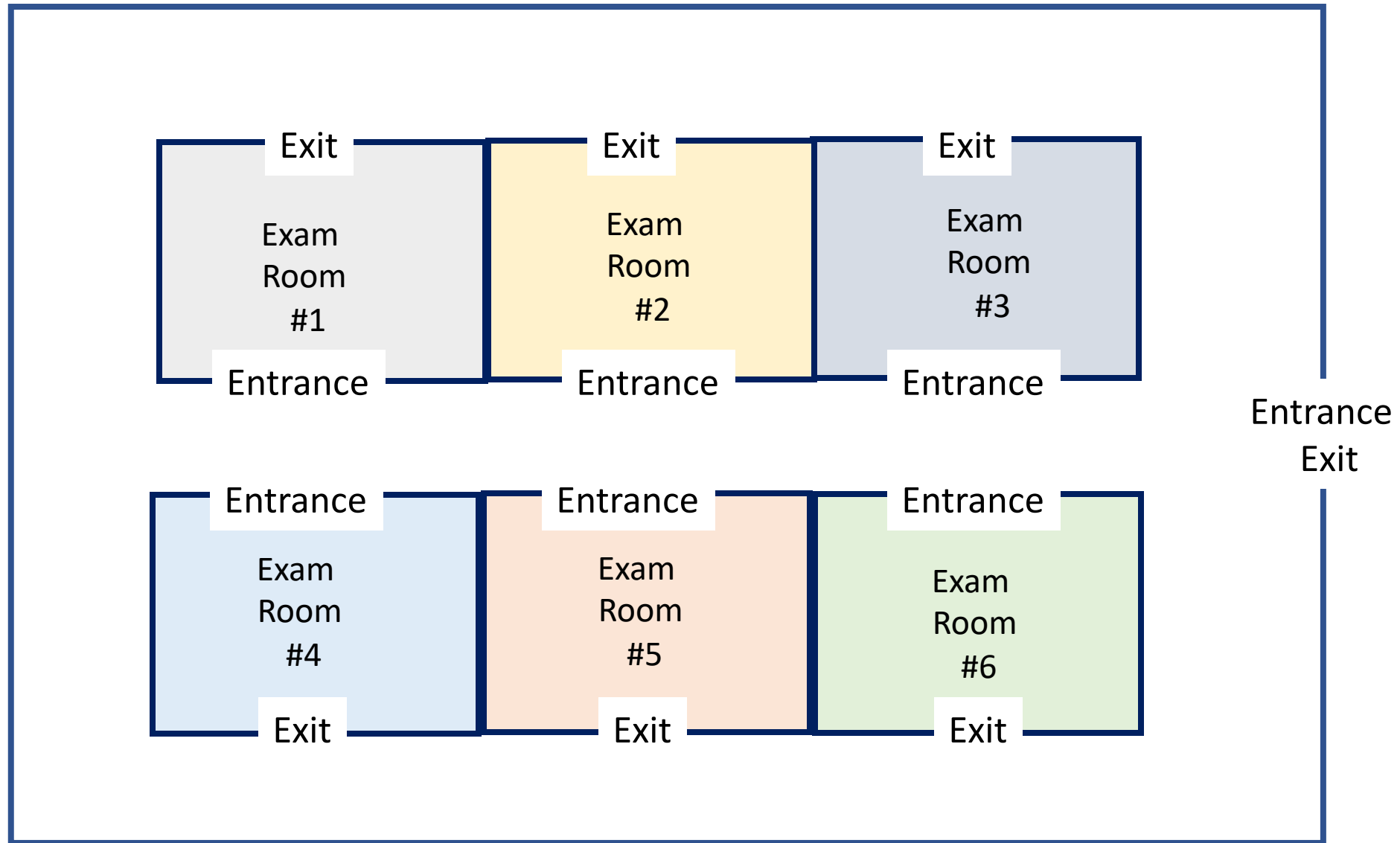
Project – Part I



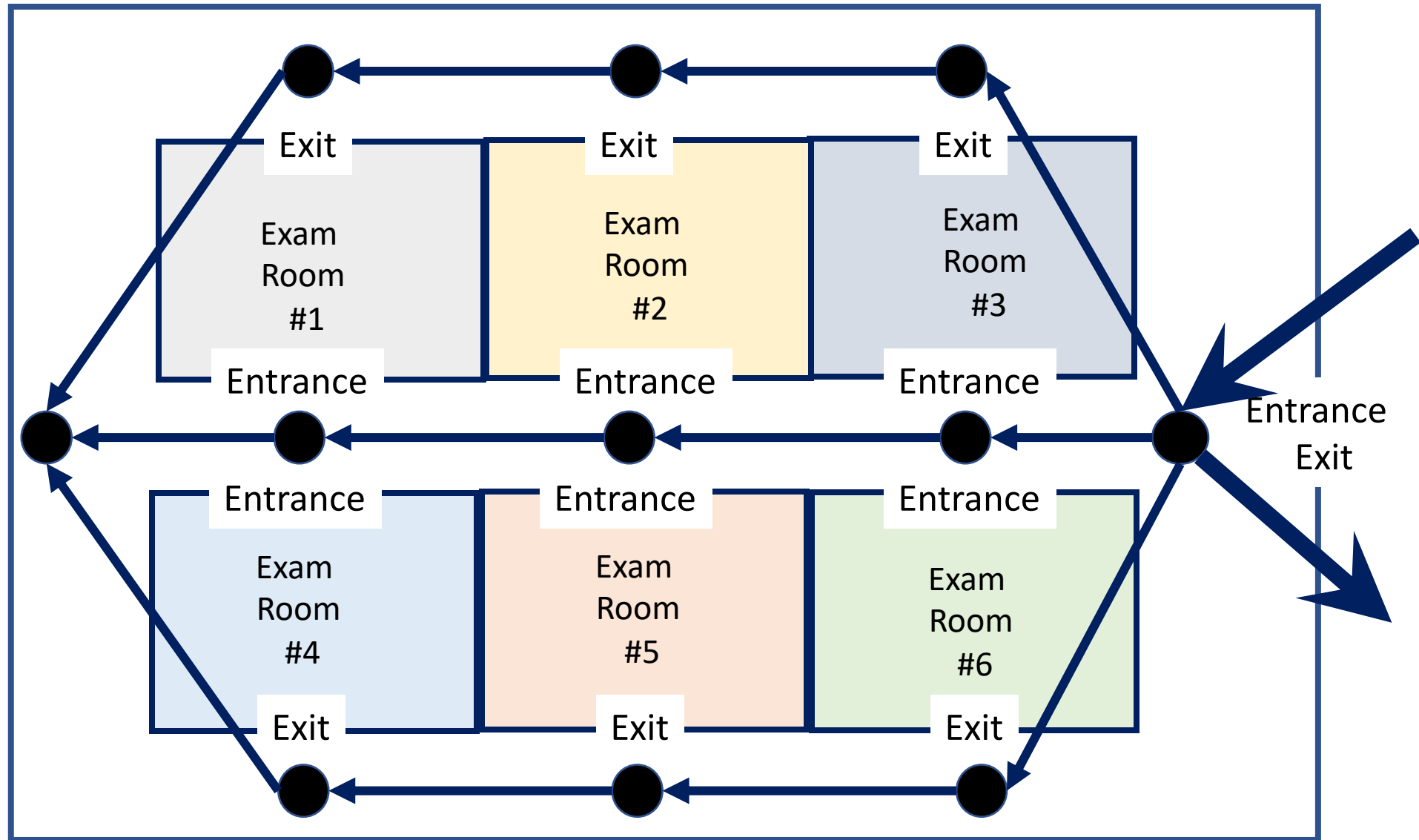


One possible solution: it is not unique



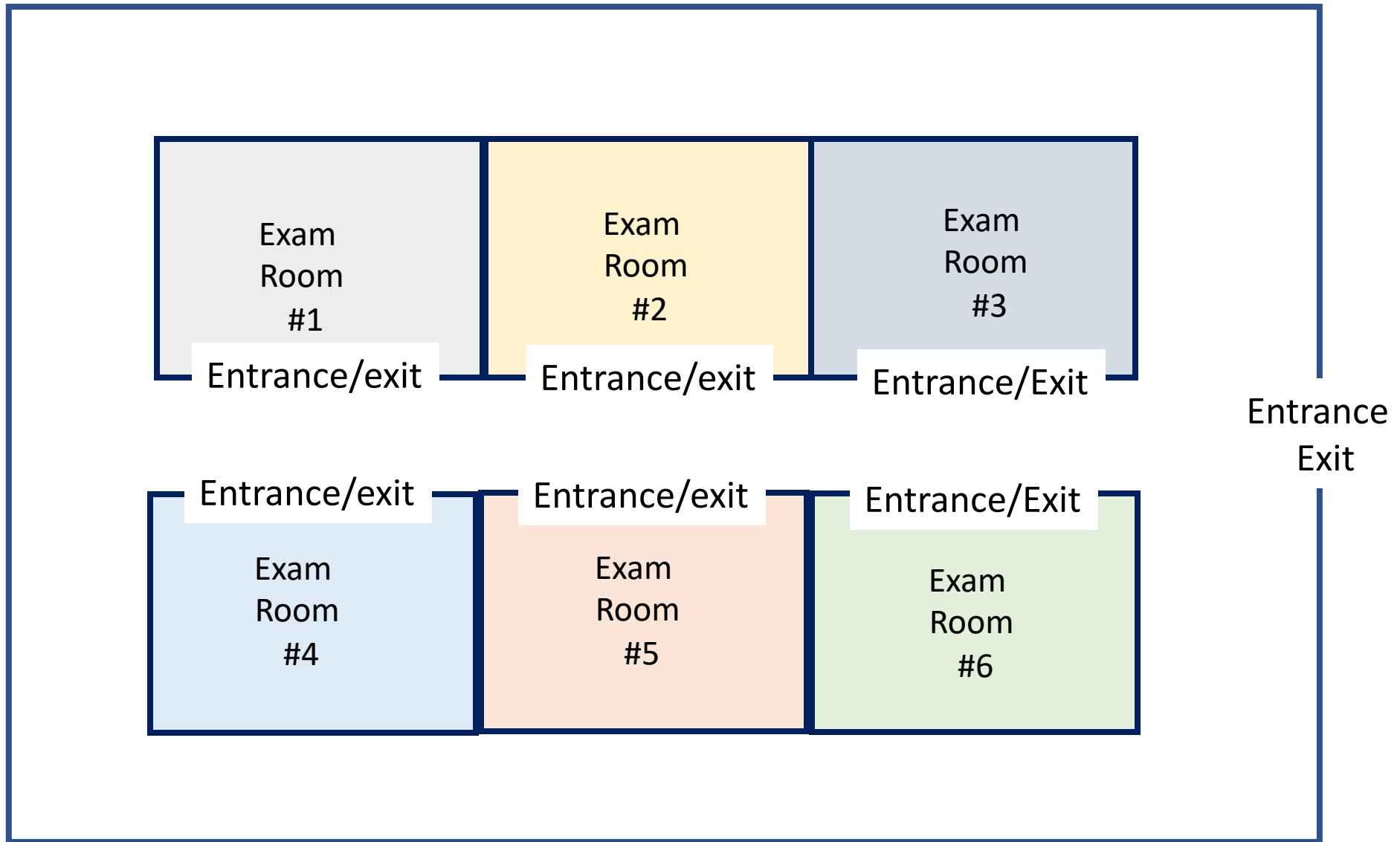


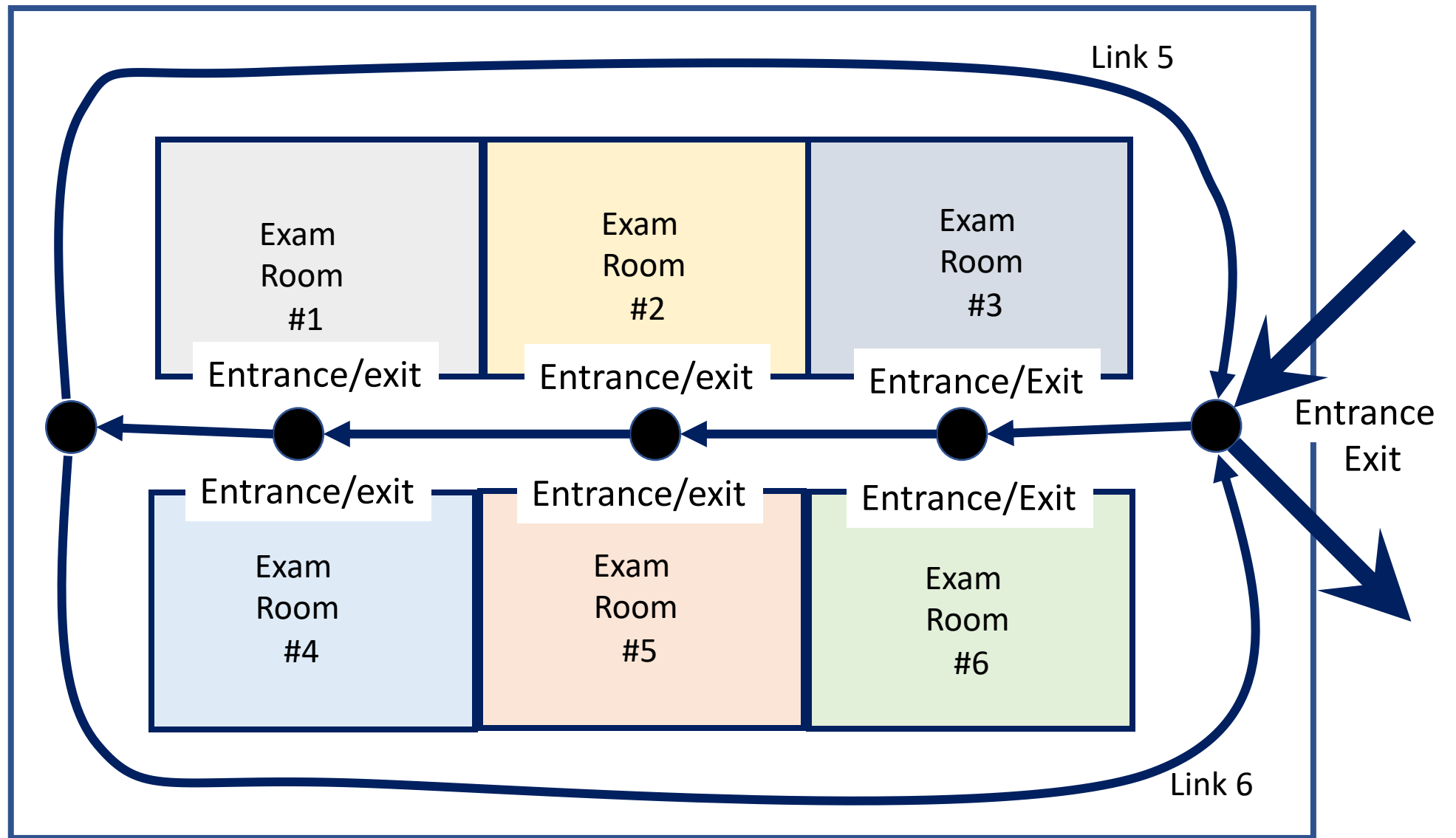
One possible solution: it is not unique

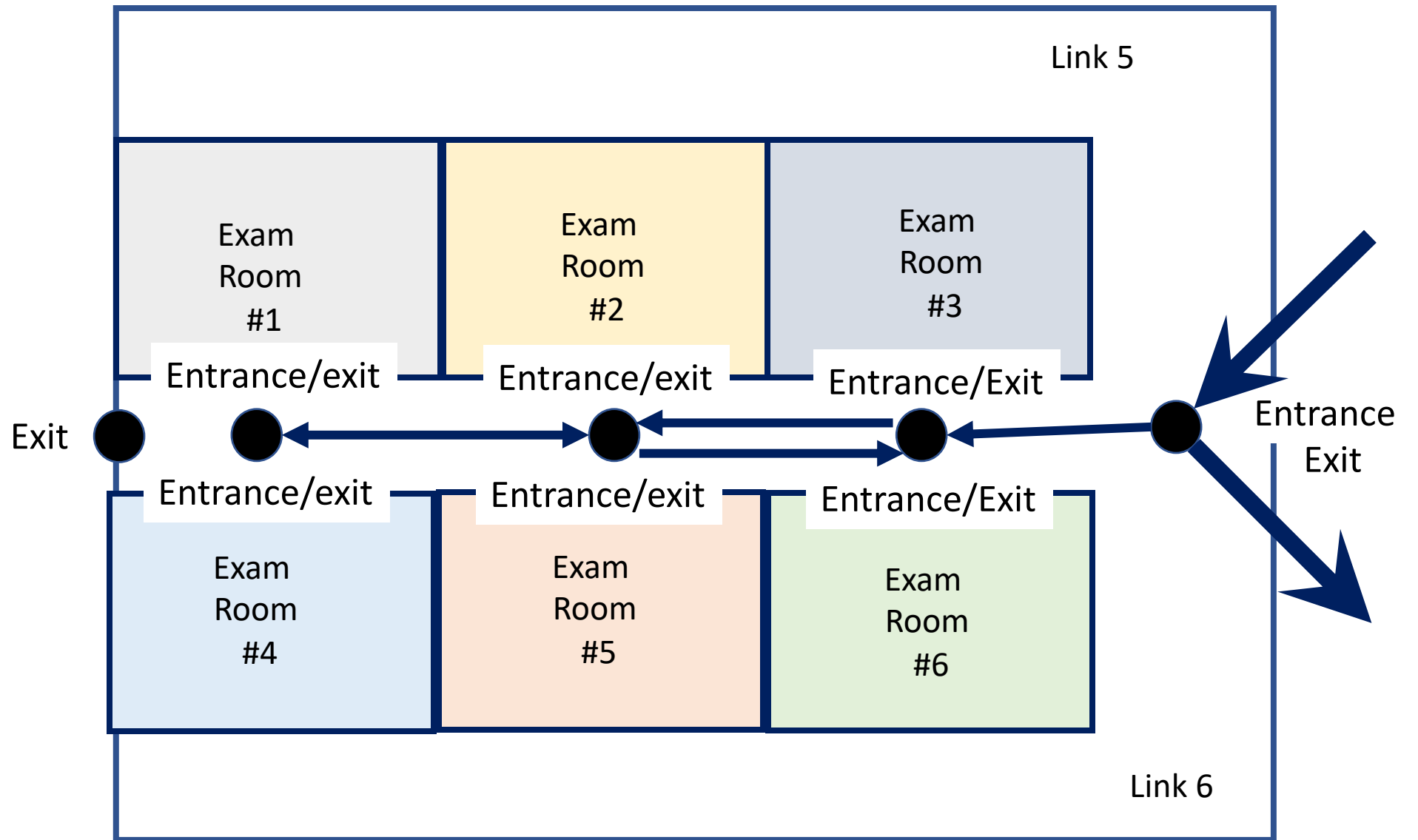


Comments

- You can see different link directions on slides 5 and 2: both are valid, but one is better than the other one.
- How can you make sure you will get solution of slide 2 rather than the solution of slide 5?



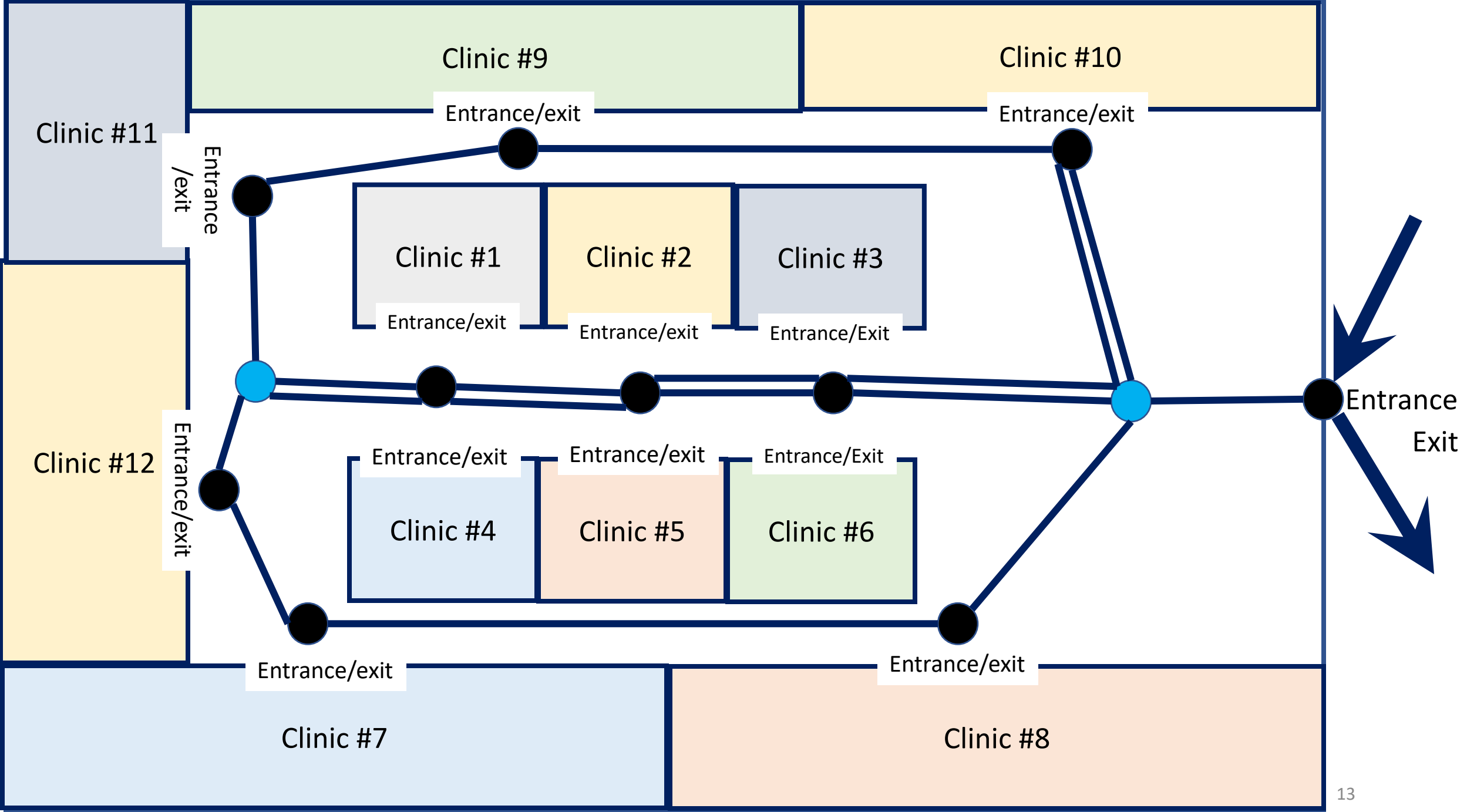




Comments

- What is the interest of keeping both links 5 and 6?

Project – Part II



Paper #1

ARTICLE

Finding paths with minimum shared edges



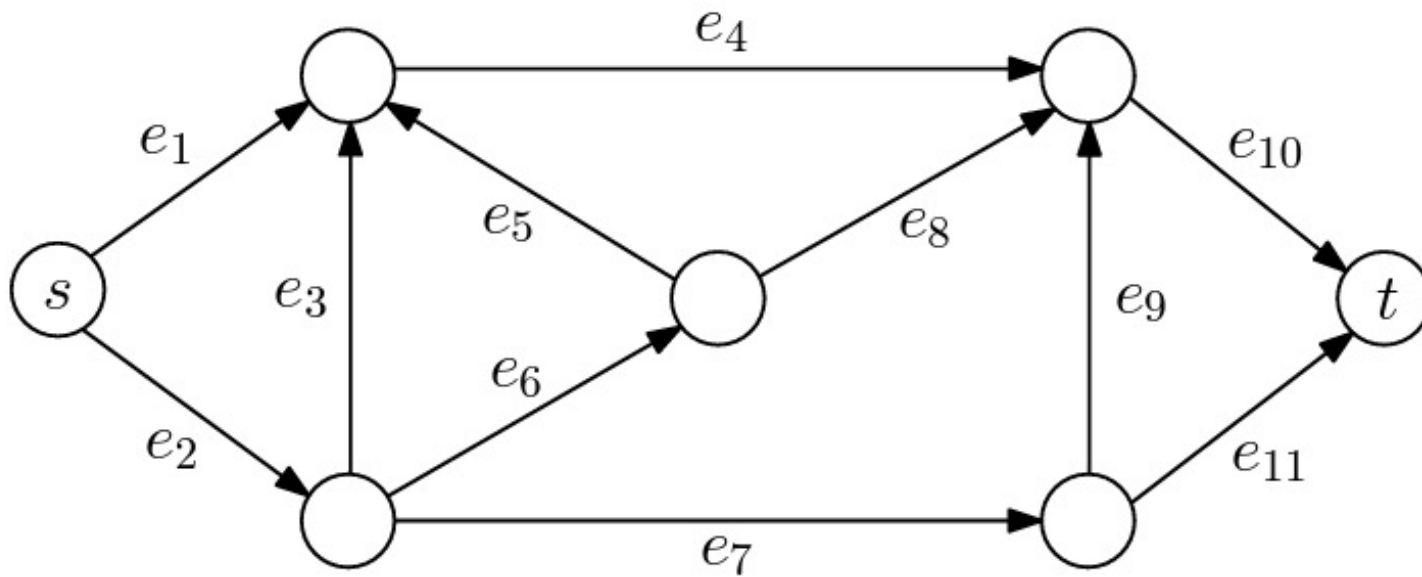
Authors:  [Masoud T. Omran](#),  [Jörg-Rüdiger Sack](#),  [Hamid Zarrabi-Zadeh](#) [Authors Info & Claims](#)

COCOON'11: Proceedings of the 17th annual international conference on Computing and combinatorics • August 2011
• Pages 567–578

Shared Link

- Given a graph G , two special nodes v_{SRC} and v_{DST} in G , and a number k , find k paths from v_{SRC} to v_{DST} in G so as to minimize the number of links shared among the paths.

A graph G with six possible (s,t) -paths, denoted by π_1 to π_6



$$\pi_1 = \langle e_1, e_4, e_{10} \rangle$$

$$\pi_2 = \langle e_2, e_7, e_{11} \rangle$$

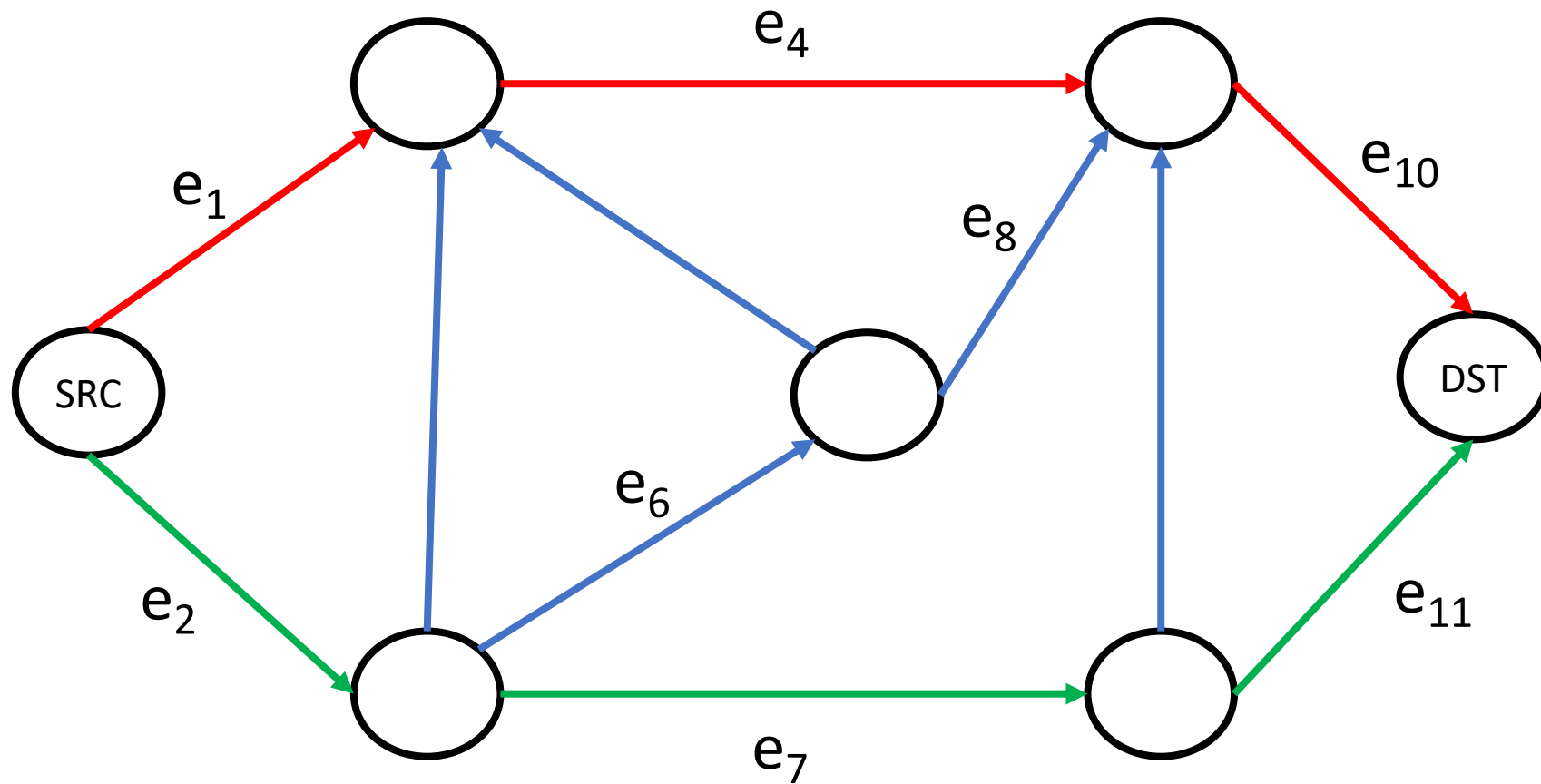
$$\pi_3 = \langle e_2, e_6, e_8, e_{10} \rangle$$

$$\pi_4 = \langle e_2, e_3, e_4, e_{10} \rangle$$

$$\pi_5 = \langle e_2, e_7, e_9, e_{10} \rangle$$

$$\pi_6 = \langle e_2, e_6, e_5, e_4, e_{10} \rangle$$

A graph G with six possible (s,t) -paths, denoted by π_1 to π_6



$\pi_1 = (e_1, e_4, e_{10})$
 $\pi_2 = (e_2, e_7, e_{11})$
 $\pi_6 = (e_2, e_6, e_8, e_{10})$
2 shared links

Paper #2



Discrete Applied Mathematics
Volume 116, Issue 3, 15 February 2002, Pages 271-278



Note

A note on orientations of mixed graphs

Esther M. Arkin^{1, a}  , Refael Hassin^b 

Concept of essential edge

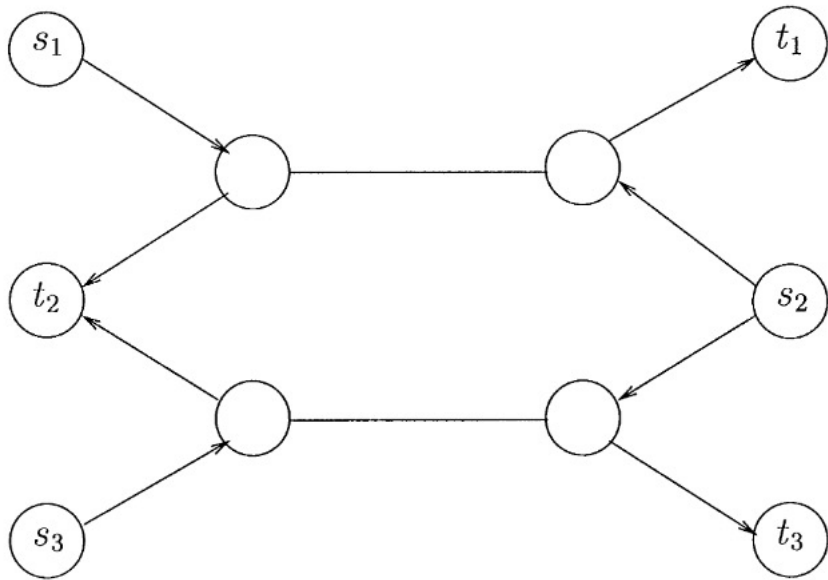


Fig. 2. A graph with no P -orientation and no essential edge.

- In the project: use essential edge for “alternating” edge, i.e., edge used in both directions.
- Since edge cannot be used in both directions at any given time, it slows down the circulation of people in the corridor

Maximize throughput

- General definition
 - Throughput = rate of production or the rate at which something is processed.
- Often used in the context of networking
 - Rate of *successful* messages or packets delivery over a communication channel.
- In the context of the project
 - Number of people reaching their destination per time unit

Maximizing the throughput

- Minimize the number of link sharing as they correspond to merging flows
- Minimize the number of edges with no fixed orientation
- Example of next slide
 - Blue edges are alternating edges

