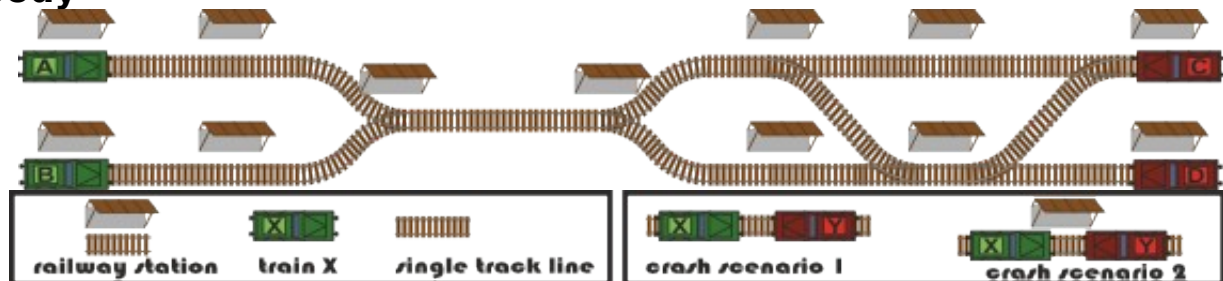


# 2014-AT-02-EN Railway-System

0 ----		I: ----		II: ----		III: hard		IV: medium			
<input checked="" type="checkbox"/> ALG		<input type="checkbox"/> INF		<input type="checkbox"/> STRUC		<input type="checkbox"/> PUZ		<input type="checkbox"/> SOC		<input type="checkbox"/> USE	

Answer Type: Multiple Choice Graphics are: self made and colorblind proof

## Body



In the mapped railway-system the trains A and B have to swap their positions with the trains C and D.

All trains will start in a schedule with an offset of one hour.

It takes one hour to cover the distance between two stations.

Once a train has started it can not be held back anymore.

The scheduler has to prevent all crash scenarios.

Scenario 1 occurs if two trains use the same single track line at the same time.

Scenario 2 occurs if two trains pull into the same station at once.

Now it's on you to create the train-schedule.

## Question

How does your train-schedule looks like?

## Answer

<b>A)</b>				
	Train A	Train C	Train B	Train D
<b>B)</b>				
	Train A	Train B	Train C	Train D
<b>C)</b>				
	Train A	Train D	Train C	Train B
<b>D)</b>				
	Train A	Train C	Train D	Train B

## Explanation

Correct solution is B)!

All other options will end up in a crash scenario. If you don't list A and B first your trains will crash at the bottle neck of the railway-system.

That's reasonable because C and D have to cover a longer distance to arrive at the bottle neck.

## It's informatics

The scheduler in this task works like a semaphore in an operating system. A semaphore is a data type consisting of both integer and access operations. It can be used for controlling access to a common resource in a multi-user environment for example. Each process (user) that requests access to the resource has to call an access-operation first. The semaphore has to prevent that two processes modify/use one and the same resource at the same time to suppress interactive manipulation. In the task the scheduler has to map the train schedule correctly to prevent simultaneously use of the bottle-neck part of the railway-system.

## Keywords

scheduling, semaphore, multi-user environment, bottle-neck

## Websites

Scheduling: [http://en.wikipedia.org/wiki/Scheduling\\_%28computing%29](http://en.wikipedia.org/wiki/Scheduling_%28computing%29)

Semaphore: [http://en.wikipedia.org/wiki/Semaphore\\_%28programming%29](http://en.wikipedia.org/wiki/Semaphore_%28programming%29)

## Internal Use

### Wording

Offset = the time interval between the first move of train X and train Y

### Comments

Roman Ledinsky, 2014-01-26, reworked version, "it's informatics" old process scheduling and memory management replaced by new semaphore description.

Andy:

Figures were slightly reworked to cover ambiguity – station position changed.

### Files

2014-AT-02-EN.odt (this file)

2014-AT-02-EN.svg (image file)

2014-AT-02-EN-new.svg (image file) → engine-\*.png, 2014-AT-02-EN-new.png

2014-AT-02-EN-legend.svg (image file) → 2014-AT-02-legend.png

### Authorship

Mario Winkler, 2013-11-09, Initial version.

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