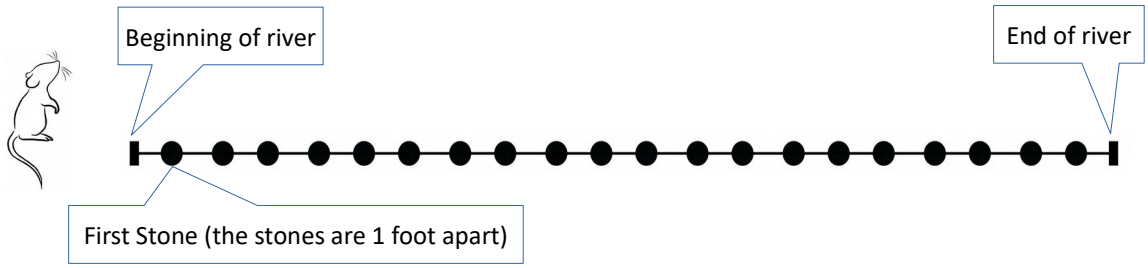
TASKS

Write <u>efficient</u> algorithms to solve each of the three tasks below:

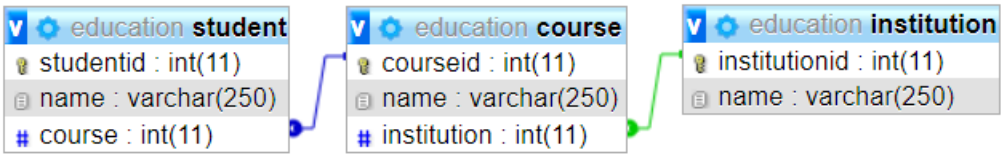
1) Given an array K with N integers from 1 to N+1 such that the array has exactly one integer missing, write a Java function that returns the missing integer.
   e.g. given K = [3,5,4,1], the function should return 2

2) Given a string S of length N, write a Java function that transforms the string by reversing characters in groups of four, and returns the transformed string.
   e.g. when S = 'Lorem at' the output should be 'eroLta m'
   when S = ' Tempor ip' the output should be 'meT roppi'

3) A mouse is looking over a river that's 21 feet wide. There are 20 stones placed in the river 1 foot apart, such that there is 1 foot from the beginning of the river to the first stone, and 1 foot from the first stone to the next stone, and so on; and 1 foot from the last stone to the end of the river. The mouse can jump over 1 foot or 2 feet such that the first step the mouse can make is either from the beginning of the river to the first stone, or from the beginning of the river to the second stone. If the mouse can't jump backwards, write a Java function that returns the number of different ways the mouse can jump from the beginning of the river to the end of the river.



4) You're given a database (education) with three tables (student, course, institution) as illustrated below:



   a) Use the diagram above to create the tables (the database, table and column names should remain as indicated)
   b) Write a MySQL query that will display the number of students per course per institution in the format below

INSTITUTION NAME	COURSE NAME	NUMBER OF STUDENTS
University College Dublin	Bsc. Actuarial Science	50
University College London	MPhil Genomics	9