

# Kattis Problem Practice Tool

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# Meet the Team & Our Client



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# The Problem

- COMP222 students use Open Kattis to practice throughout the semester for the International Collegiate Programming Competition.
- Open Kattis problems are limited and solutions are often easy to find.
- Professor Majikes finds it difficult to distribute and provide a solution for new individual problems.

How might we create a new practice tool so that students can easily access new problems, created by the professor, and receive prompt feedback ?



# Users

## Students

- Browse problems with descriptions, along with sample input/output.
- Upload problem solution file written in their preferred language and receive instant feedback.

## Administrators

- Create and upload new Kattis-like problems to site, allowing students to access new problems.
- Create solution outputs to cross-check with uploaded student solution files.

# User Interface Mockup

## Student View

[Home](#)[cstamper](#)

### Kattis Tool

#### 0-1 Sequences

You are given a sequence, in the form of a string with characters '0', '1', and '?' only. Suppose there are  $k$  '?'s. Then there are  $2^k$  ways to replace each '?' by a '0' or a '1', giving  $2^k$  different 0-1 sequences (0-1 sequences are sequences with only zeroes and ones). For each 0-1 sequence, define its number of inversions as the minimum number of adjacent swaps required to sort the sequence in non-decreasing order. In this problem, the sequence is sorted in non-decreasing order precisely when all the zeroes occur before all the ones. For example, the sequence 11010 has 5 inversions. We can sort it by the following moves: 11010  $\rightarrow$  11001  $\rightarrow$  10101  $\rightarrow$  01101  $\rightarrow$  01011  $\rightarrow$  00111. Find the sum of the number of inversions of the  $2^k$  sequences, modulo 1000000007 (109+7).

#### Input

The first and only line of input contains the input string, consisting of characters '0', '1', and '?' only, and the input string has between 1 to 500000 characters, inclusive.

#### Output

Output an integer indicating the aforementioned number of inversions modulo 1000000007.


Sample Input: ?0? | Sample Output: 3

#### Submit Solution

 No file chosen

# User Interface Mockup

## Administrator View



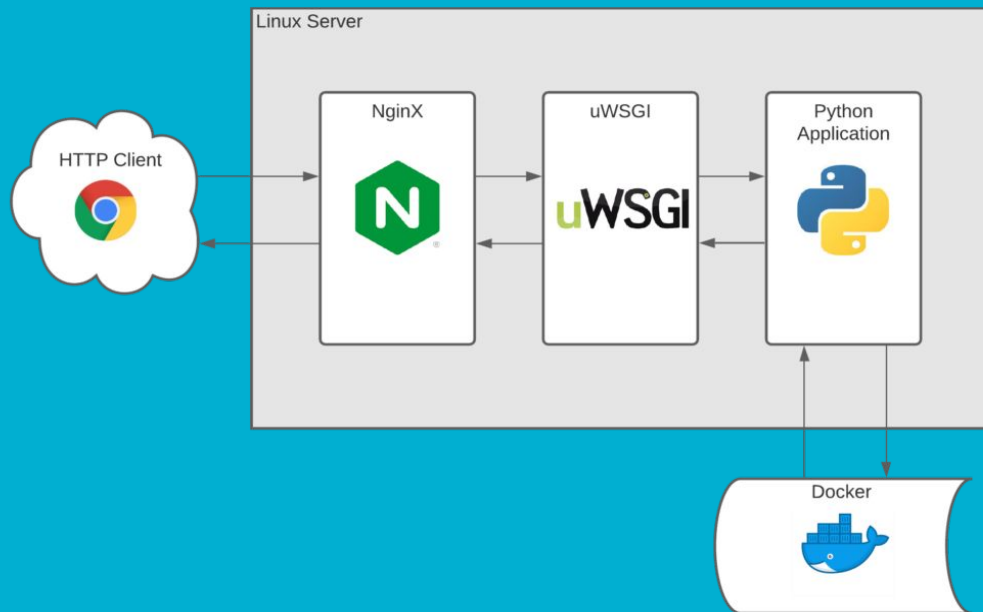
The mockup shows a form with a light blue border. It contains two text input fields. The first field is labeled "Problem Description" and is a large rectangular box. The second field is labeled "Problem Solution" and is a smaller rectangular box. Below the "Problem Solution" field is a small "Submit" button. The form is set against a solid blue background.

Problem Description

Problem Solution

Submit

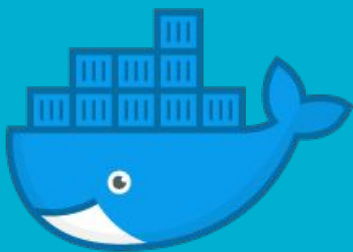
# Technical Overview



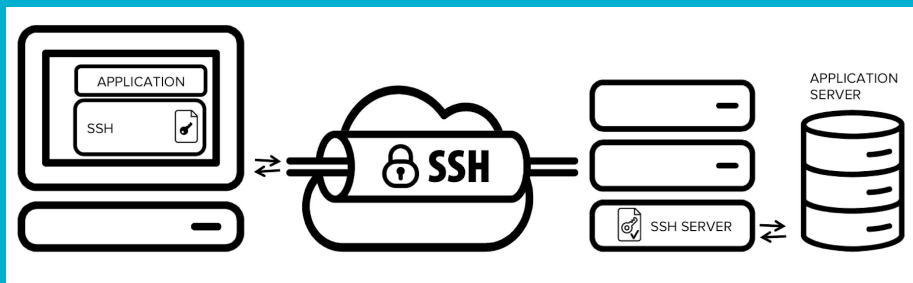
- NginX - web server
- uWSGI - web-application server gateway
- Python - application logic
- Docker - remote services

# Platform Description

- Bottle framework for Python web applications
- Docker to run tests
- Local command line and SSH tunnels
- VSCode to edit files and make push/pull requests



# Bottle





Thanks!

