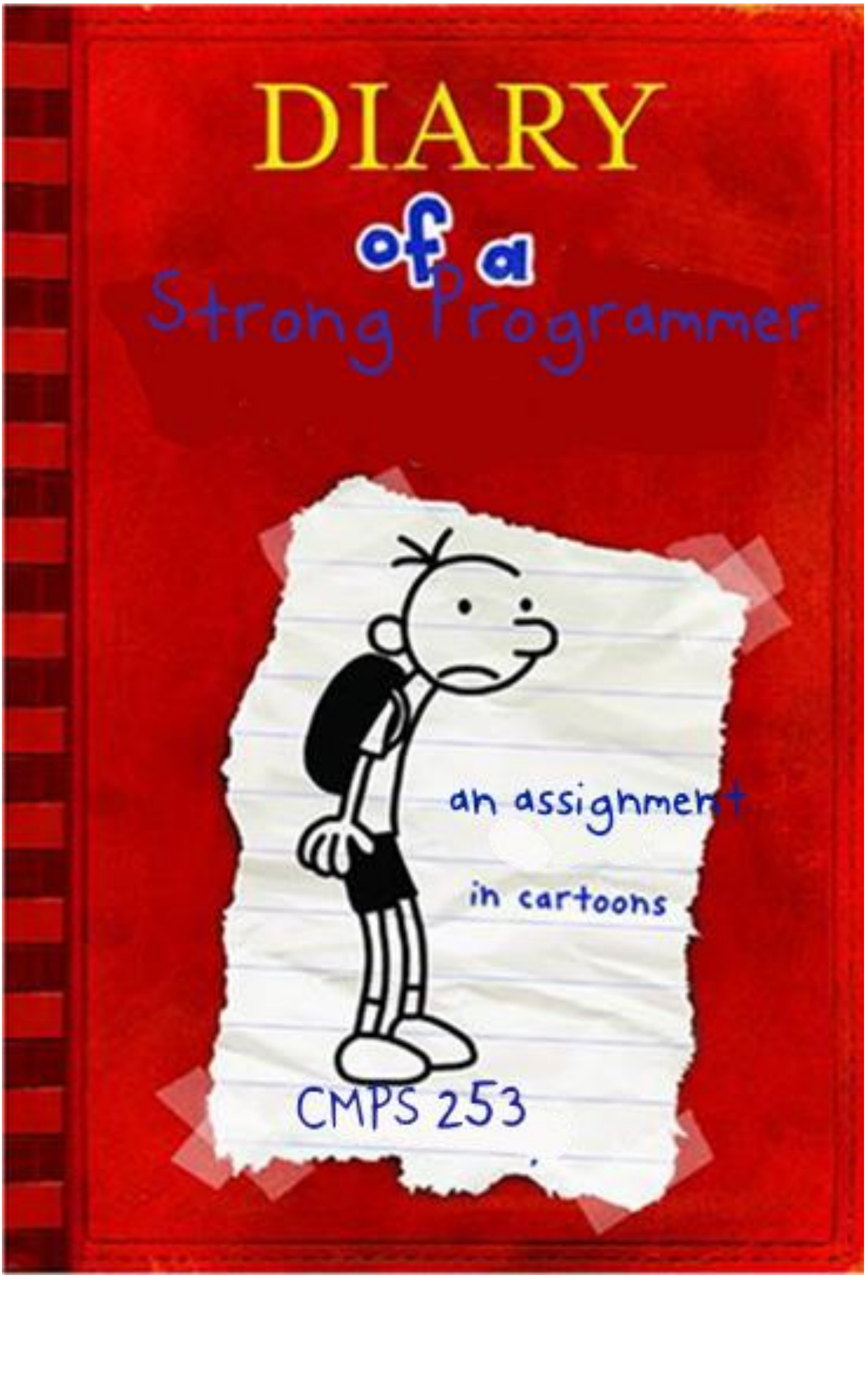

DIARY
of a
Strong Programmer
an assignment
in cartoons
CMPS 253

The professor of a software engineering course likes to automate everything possible. He also likes to immerse his students in programming assignments that are exciting (not boring) and useful. He has also been known to repeat a maxim: "a good programmer is a lazy programmer". One day he decided to have his students write a program to grade their own midterm exam.

He started by writing a midterm exam that consists of multiple choice questions and instructing the students not to circle the letters representing the correct answers as is normally asked, but rather write their answers on an answer sheet provided as the last page of the exam pamphlet. When the exam concluded, he instructed his two talented TAs to not grade the exam, but instead simply provide him with a file that represents the answers produced by every student for every question. He even told them he made their job easier by having the answers for each student on one sheet only. The TAs were ecstatic—one of them really showed it, but the other was reserved— then they agreed with the professor on this file format:

```
9BjK3P|a|b,d|a,c,d|…
U9Ld1z|a|a,b|c|…
…
```

Explanation: Each line represents the answers provided by one student. Since there were three absent students, the file is 100 lines long (as the class has 103 students total). Each line has an answer for each of the 40 questions, each separated by a vertical pipe bar like this |. Each line starts with a six alphanumeric string called a *safe token* that represents a unique student. Only the professor knows which student is represented by each safe token. For example: the first line shown above, states that the student whose safe token is 9BjK3P, chose (a) as the correct answer for question 1, and both (b) and (d) as the correct answers for question 2, and (c) as the correct answer for question 3, etc.

The students seemed happy with the exam (they were not expecting a multiple-choice exam) and when the exam concluded, everyone left home for the weekend with a smiley face.

The professor had created a similar file that has the answer key to the midterm. The file format is similar to the one agreed upon by the TAs:

```
a
b,*c,d
b,c
…
```

..except for two differences:

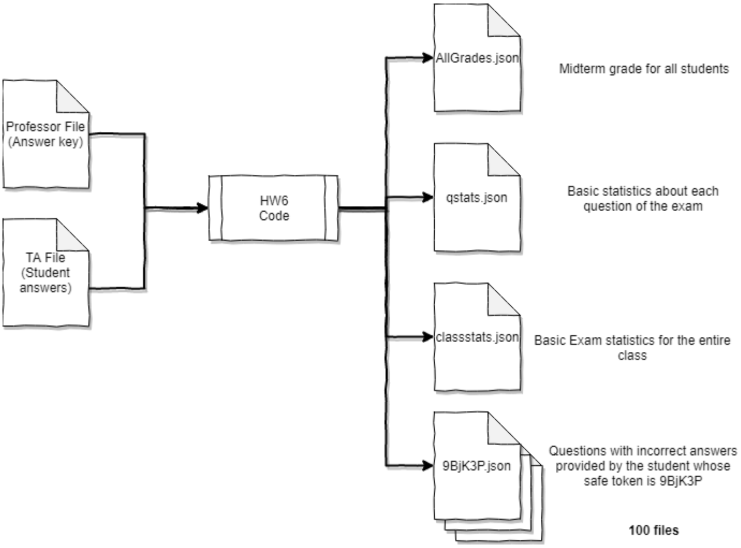
1- Each line provides the answer for one question (in order)

2- some answers has their letter preceded by * to indicate the answer is to be ignored (points are not deducted if the student chose that letter as an answer or not). For example, the student whose safe token is 9BjK3P gets full mark for question 2.

The professor then told his students to write a program using any programming language to grade the midterm by comparing the answers provided by the students to the answer key provided by the professor. Each question is worth 5 points (total 200 points) according to the following table where (a,c) is correct:

	a	a	a#	a#	a#	a#
	b	b#	b	b	b	b#
	c	c	c	c	c#	c#
	d	d	d	d#	d#	d#
Grade	0	0	+50%	+50% - 25%	+ 100% - 25%	+ 100% - 50%

The program is to produce 103 files as shown in the following diagram:


Professor File (Answer key)
TA File (Student answers)
HW6 Code
AllGrades.json
Midterm grade for all students
qstats.json
Basic statistics about each question of the exam
classstats.json
Basic Exam statistics for the entire class
9BjK3P.json
Questions with incorrect answers provided by the student whose safe token is 9BjK3P
100 files

Sample of each output file:

QStats.json

```
[{
        "Q": 1,
        "Min": 0.0,
        "FirstQuartile": 1.0,
        "Mean": 3.5,
        "Median": 4.0,
        "ThirdQuartile": 4.5,
        "Max": 5.0,
        "Mode": 3.3
}, {
        "Q": 2,
        "Min": 3.0,
        "FirstQuartile": 4.0,
        "Mean": 4.7,
        "Median": 4.7,
        "ThirdQuartile": 4.9,
        "Max": 5.0,
        "Mode": 4.7
}]
```

AllGrades.json

```
[{
        "SafeToken": "9BjK3P",
        "Grade": 180.4
}, {
        "SafeToken": "U9Ld1z",
        "Grade": 143.75
}]
```

ClassStats.json

```
{
        "Min": 100.0,
        "FirstQuartile": 50.0,
        "Mean": 100.22,
        "Median": 100.0,
        "ThirdQuartile": 175.0,
        "Max": 200.0,
        "Mode": 155.0
}
```

9BjK3P.json

This sample indicates that the student whose safe token is 9BjK3P answered 3 questions incorrectly: question 5, the student provided (a) and (c) as an answer, etc.

```
[{
        "QuestionNumber": 5,
        "StudentAnswer": "a,c"
}, {
        "QuestionNumber": 24,
        "StudentAnswer": "c"
}, {
        "QuestionNumber": 38,
        "StudentAnswer": "a,b,d,e"
}]
```