

CS 4240: Compilers and Interpreters, BONUS Project, Spring 2022

Assigned: January 10, 2022, 10% of course grade
(10% of course grade or replacing one of the projects)

Due by 11:59pm on April 20, 2022

1 Project Description

Minimize the file `a.smt2` such that it preserves the property defined in Definition 1.

Definition 1 (Property). *Let `cvc4` be the provided solver program. We say that the file `a.smt2` holds the property iff:*

- *The command “`cvc4 --lang=smt2.6 a.smt2`” returns “`sat`”; and*
- *If we replace “`set-logic ALL`” with “`set-logic QF_NIA`” in `a.smt2`, the command “`cvc4 --lang=smt2.6 a.smt2`” returns “`unknown`”.*

We have also provided a bash script `b.sh` to help you check the property. If the file `a.smt2` holds the property, the return code of `b.sh` will be 0. Otherwise, it will return 1.

Therefore, an alternative way to define the project goal is that: Minimize the file `a.smt2` such that the script `b.sh` will return 0.

1.1 Evaluation

We will determine the file size by running the provided `b.sh` script. It will count the number of characters in `a.smt2` using “`wc -c a.smt2`”. The original size of `a.smt2` is 6547.

For your property-preserving file `a.smt2`,

- You will receive 50% of the credit if the file size is smaller than 560; or
- You will receive 100% of the credit if the file size is smaller than 260.

2 Provided Code and Expected Output

We have provided the solver (`cvc4`), the input file (`a.smt2`) and the property testing file (`b.sh`) at <https://faculty.cc.gatech.edu/~qrzhang/course/cs4240/bonus22.tar.bz2>.

We will use the command “`bash b.sh`” to decide if `a.smt2` is property-preserving.

The expected property-preserving output is given as follows:

```
$ bash b.sh
sat
unknown
Correct! The size of a.smt2 is 6547.
$ echo $?
0
```

Of course, the size of `a.smt2` may vary.

3 Submission

Send an email to the instructor with the title “[CS 4240 Bonus Project] YOUR NAME(s)” that contains:

- The minimized `a.smt2` file; and
- A document that describes the key steps to obtain the final `a.smt2` file.

4 Collaboration

For this BONUS project, you can form a team of *at most* two people.

We will award identical grades to each member of a given project team, unless members of the team directly register a formal complaint. We assume that the work submitted by each team is their work solely. Any clarification question about the project handout should be posted on the course’s public Piazza message board. Under no condition is it acceptable to use code or source written by another team.