Methodologies for Software Processes

Seminar 2

Assignment 2

- Please complete the following tasks until Seminar 3.
- The Assignment 2 must be presented at the Seminar 3 (all group members must be in the class).

Install Z3

We will also use the SMT solver Z3, originally developed by Microsoft research:

https://github.com/Z3Prover/z3

Precompiled binaries for most operating systems are available here:

https://github.com/Z3Prover/z3/releases/tag/z3-4.11.0

Install Z3

To test your installation of Z3,

run the command line tool create a file test.smt2 with the following content:

```
(declare-const p Bool)

(assert (and p (not p)))

(check-sat)
```

Running z3 test.smt2 should then output unsat.

Try and learn from the examples ex-s1.stmt2, ex-s2.stmt2, ex-s3.stmt2, ex-s4.stmt2, ex-s5.stmt2, ex-s6.stmt2, ex-s7.stmt2, ex-s8.stmt2, ex-s9.stmt2, ex-s10.stmt2, ex-s11.stmt2

Install Z3Py

Install Python 3.12.2 from

https://www.python.org/

That includes also pip

https://pip.pypa.io/en/stable/

Then install

C:\temp>pip install z3-solver

Try and learn from the examples ex-p1.py, ex-p2.py, ex-p3.py, ex-p4.py, ex-p5.py,ex-p6.py

Try this example

ex-s2.stmt2

Example: Course Selection

- You have to take CS Modeling, Physics, or Chemistry
- For CS Modeling, you also need Discrete Math
- For Verification, you need CS Modeling
- For Physics and Chemistry, you need Statistics
- Statistics and Discrete Math are at the same time
- CS Modeling and Physics are at the same time
- Verification and Chemistry are at the same time

Is it possible to take Verification and all preliminaries?

Is it possible to take Physics and Discrete Math?

Exercise

- Model the following problem as an instance of the SAT problem.
- There are three chairs in a row: left, middle, right.
- Can we assign chairs to Alice, Bob, and Charlie such that:
  - Alice does not sit next to Charlie,
  - Alice does not sit on the leftmost chair, and
  - Bob does not sit to the right of Charlie?

The beginning of the solution is in wedding.stm2 and wedding.py