flea

bit(e)s and pieces

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Hofstadter's Law: It always takes longer than you expect,
even when you take into account Hofstadter's Law.

— Douglas Hofstadter, Gödel, Escher, Bach: An Eternal Golden Braid

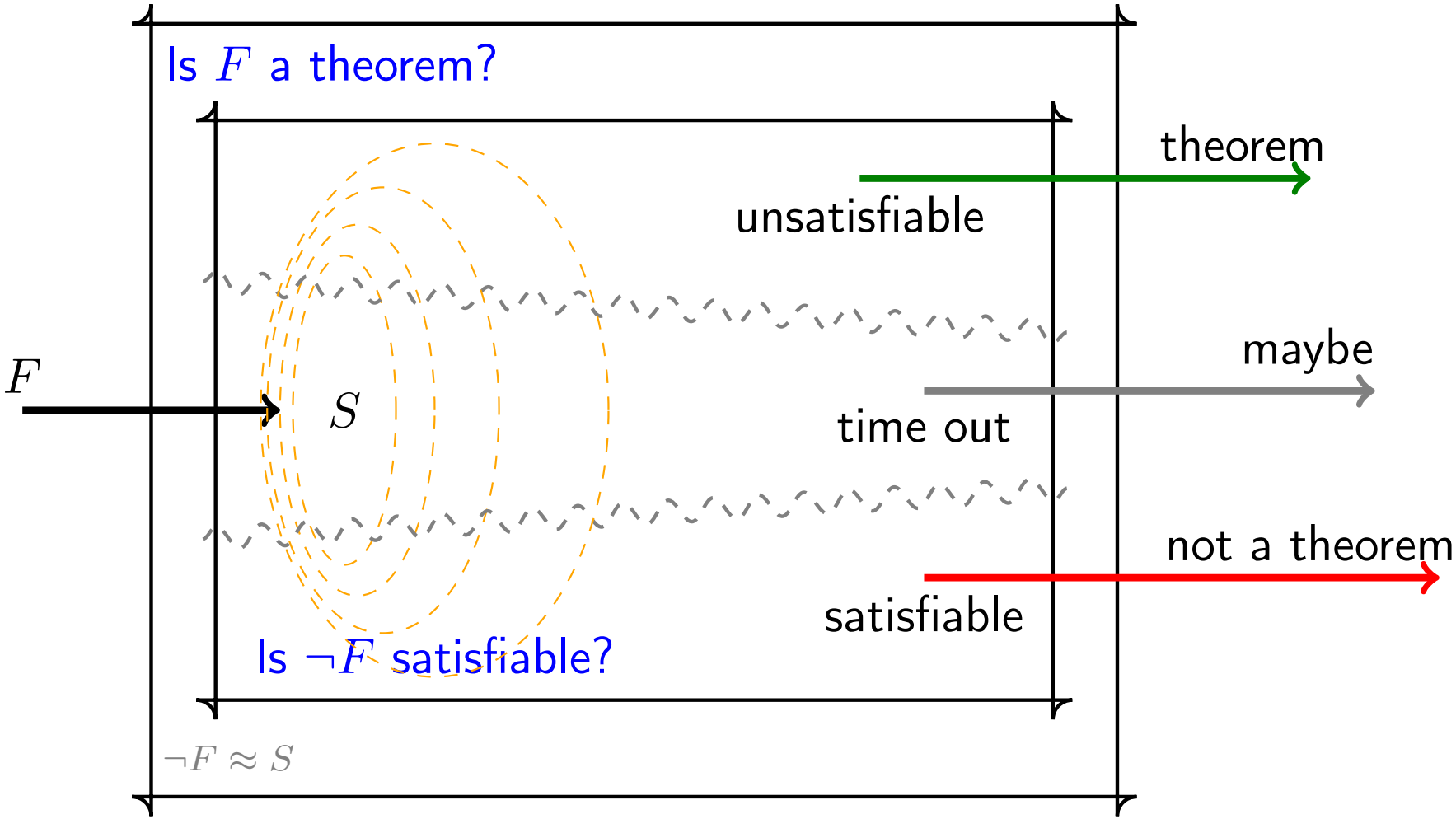
1. Previously
2. Implementation
3. Equality
4. work to do

References

Clark Barrett, Pascal Fontaine, and Cesare Tinelli, *The Satisfiability Modulo Theories Library (SMT-LIB)*, `www.SMT-LIB.org`, 2016.

Bruno Dutertre, *Yices 2.2*, Computer-Aided Verification (CAV'2014) (Armin Biere and Roderick Bloem, eds.), Lecture Notes in Computer Science, vol. 8559, Springer, July 2014, pp. 737–744.

Goal


Is F a theorem?
theorem
unsatisfiable
F
S
maybe
time out
not a theorem
satisfiable
Is $\neg F$ satisfiable?
$\neg F \approx S$

Definition (Ordered Resolution)

$$\frac{L \vee C \quad \neg L' \vee D}{(C \vee D)\sigma}$$

where

$L\sigma$ strictly maximal in $C\sigma$, $\neg L'\sigma$ maximal in $D\sigma$, $\sigma = \mathrm{mgu}(L, L')$.

Definition (Inst-Gen)

$$\frac{L \vee C \quad \neg L' \vee D}{(L \vee C)\sigma \quad (\neg L' \vee D)\sigma}$$

where

$$\mathrm{sel}(L \vee C) = L \qquad \mathrm{sel}(\neg L' \vee D) = \neg L' \qquad \sigma = \mathrm{mgu}(L, L')$$

Example (Resolution)

$$\dfrac{\dfrac{\mathsf{P}(x) \vee \neg\mathsf{P}(y) \quad \neg\mathsf{P}(\mathsf{a})}{\neg\mathsf{P}(y)}\; x \mapsto \mathsf{a} \quad \mathsf{P}(\mathsf{b})}{\square}\; y \mapsto \mathsf{b}$$

Example (Inst-Gen)

$$S_0\bot = \{\mathsf{P}(\bot) \vee \neg\mathsf{P}(\bot), \neg\mathsf{P}(\mathsf{a}), \mathsf{P}(\mathsf{b})\} \qquad \text{satisfiable}$$

$$\dfrac{\mathsf{P}(x) \vee \neg\mathsf{P}(y)) \quad \neg\mathsf{P}(\mathsf{a})}{\mathsf{P}(\mathsf{a}) \vee \neg\mathsf{P}(y)}\; x \mapsto \mathsf{a}$$

$$S_1\bot \supsetneq \{\neg\mathsf{P}(\mathsf{a}), \mathsf{P}(\mathsf{b}), \mathsf{P}(\mathsf{a}) \vee \neg\mathsf{P}(\bot)\} \qquad \text{satisfiable}$$

$$\dfrac{\mathsf{P}(\mathsf{b}) \quad \mathsf{P}(\mathsf{a}) \vee \neg\mathsf{P}(y)}{\mathsf{P}(\mathsf{a}) \vee \mathsf{P}(\mathsf{b})}\; y \mapsto \mathsf{b}$$

$$S_2\bot \supsetneq \{\neg\mathsf{P}(\mathsf{a}), \mathsf{P}(\mathsf{b}), \mathsf{P}(\mathsf{a}) \vee \neg\mathsf{P}(\mathsf{b})\} \qquad \text{unsatisfiable}$$

Subsumption

$$S = \{C, D, \ldots\} \qquad \exists\theta\ C\theta \subseteq D \qquad \text{C subsumes D}$$

$$S \text{ satisfiable} \overset{\checkmark}{\iff} (S \setminus D) \text{ satisfiable}$$

$$\theta \text{ is proper, } S\bot \text{ satisfiable} \overset{\times}{\Longleftarrow\!\!\!\Longrightarrow} (S \setminus D)\bot \text{ satisfiable}$$

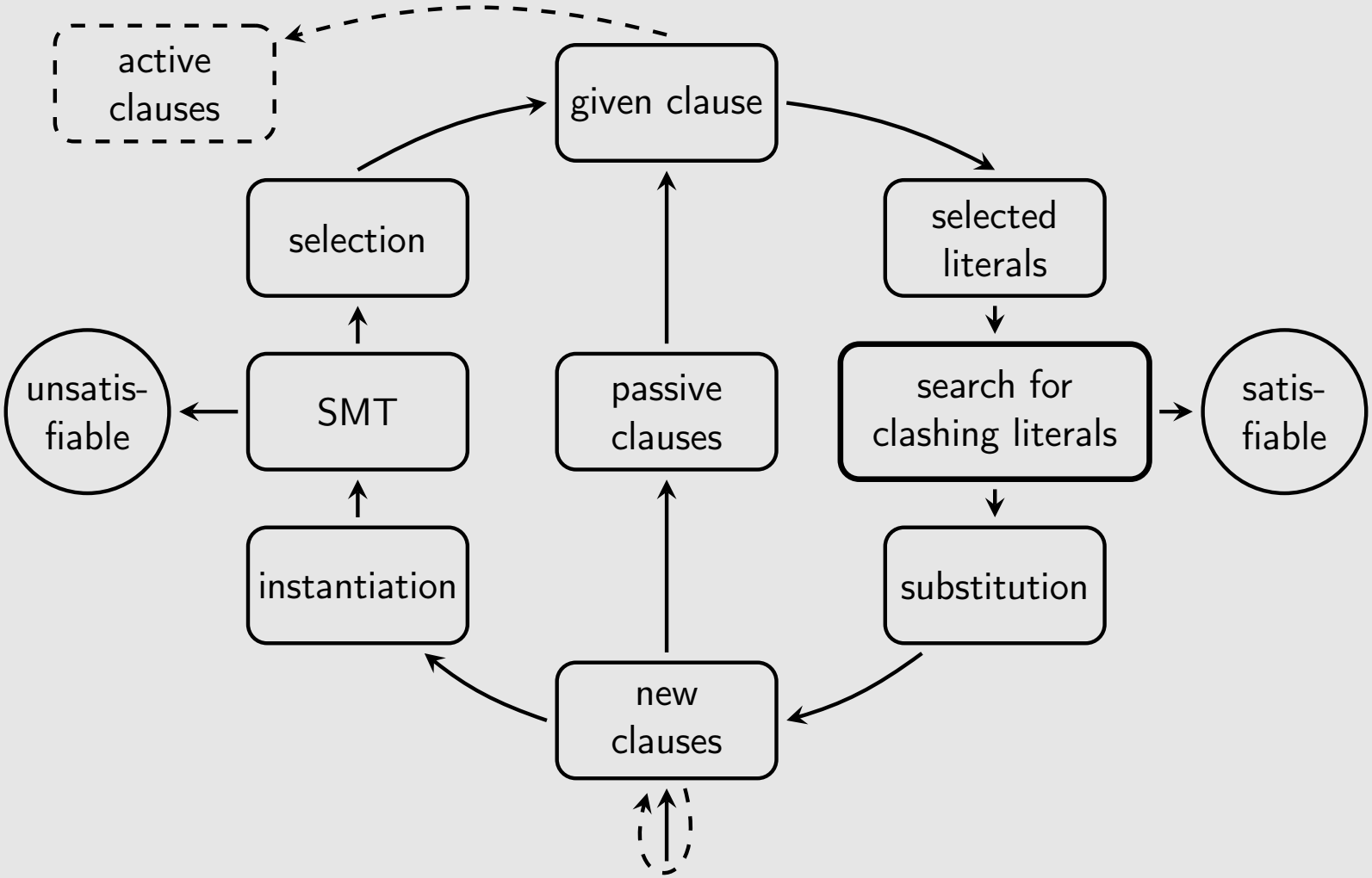
$$\theta \text{ is renaming, } S\bot \text{ satisfiable} \overset{\checkmark}{\iff} (S \setminus D)\bot \text{ satisfiable}$$

Example

$$\{\mathsf{P}(x, y), \neg\mathsf{P}(\mathsf{a}, z)\} \qquad \{\mathsf{P}(x, y), \neg\mathsf{P}(\mathsf{a}, z), \mathsf{P}(\mathsf{a}, z)\}$$

$$\{\mathsf{P}(\bot, \bot), \neg\mathsf{P}(\mathsf{a}, \bot)\} \qquad \{\mathsf{P}(\bot, \bot), \neg\mathsf{P}(\mathsf{a}, \bot), \mathsf{P}(\mathsf{a}, \bot)\}$$

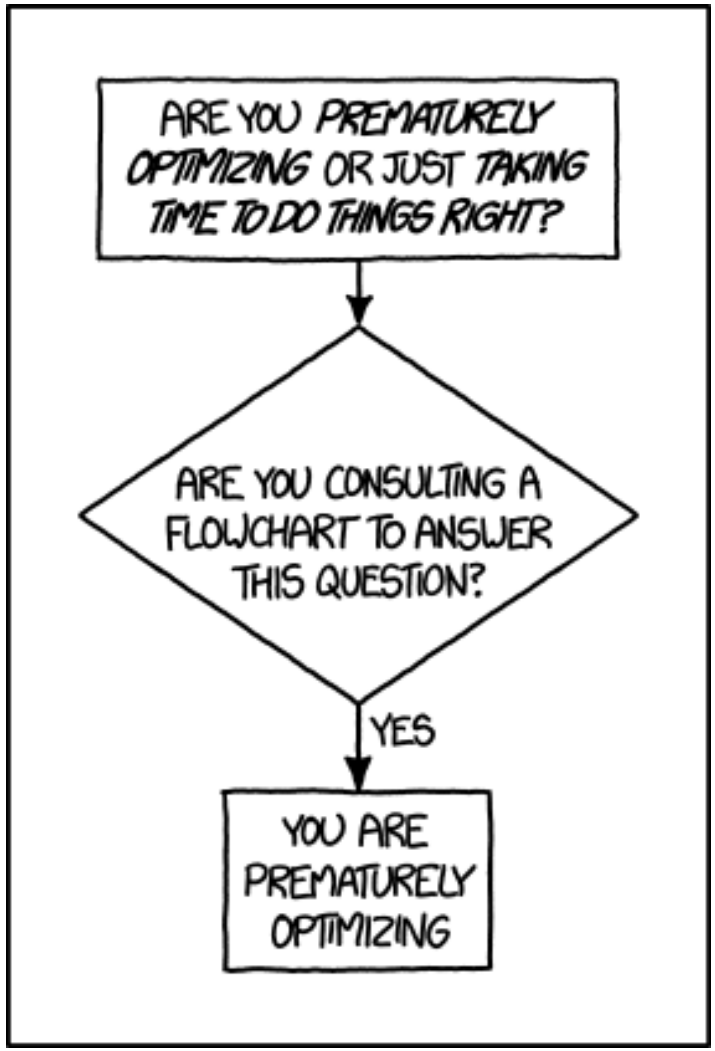
Run-Loop


active clauses
given clause
selection
selected literals
unsatis-fiable
SMT
passive clauses
search for clashing literals
satis-fiable
instantiation
substitution
new clauses

Hello, World!

1. Path indices of selected literals for clauses to find clashing literals
2. Discrimination trees of literals for clauses to find variants of clauses

- migrate to Linux / Swift 3
- integrate unit superposition
- integrate ordered maximal completion
- experiments
- optimizations


ARE YOU PREMATURELY OPTIMIZING OR JUST TAKING TIME TO DO THINGS RIGHT?
ARE YOU CONSULTING A FLOWCHART TO ANSWER THIS QUESTION?
YES
YOU ARE PREMATURELY OPTIMIZING