# Submissions to QBFEVAL'18

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# DepQBF Variants with Preprocessors (1)

**DepQBF:**

- Conflict-driven clause and solution-driven cube learning (QCDCL) [GNT06, Let02, ZM02].
- Based on latest publicly available version 6.03 [LE17]: `http://lonsing.github.io/depqbf/`
- Advanced cube learning [LBB+15] by tightly integrating blocked clause elimination [BLS11, HJL+15] into QCDCL.
- Dynamic applications during search: SAT solver PicoSAT [Bie08] expansion-based QBF solver Nenofex [LB08] to derive learned clauses/cubes [LES16].
- Limited reverse-engineering of Tseitin encodings: try to optimize position of existential variables in prefix.

# DepQBF Variants with Preprocessors (2)

**QRATPre+:** [LE18]

- Based on generalization of QRAT proof system [HSB17].
- Preprocessing by elimination of clauses and universal literals.
- `https://lonsing.github.io/qratpreplus/`

# DepQBF Variants with Preprocessors (3)

**QBFRelay:**

- Shell script to coordinate several preprocessors: QxBF [LB11], Bloqqer [BLS11], HQSpre [WRMB17], and QRATPre+ [LE18].
- Preprocessed formula produced by one tool is used as input of the next.
- Preprocessors are executed in rounds until formula does not change anymore or time limit exceeded.
- Formulas are often solved by preprocessing already.

# DepQBF Variants with Preprocessors (4)

**Included Software Packages:**

- runsolver, tool to limit resources:
  `http://www.cril.univ-artois.fr/~roussel/runsolver/`
- PicoSAT, SAT solver, version 960:
  `http://fmv.jku.at/picosat/`
- Nenofex, QBF solver, version 1.1:
  `https://github.com/lonsing/nenofex`
- QxBF preprocessor, version 1.2:
  `http://fmv.jku.at/qxbf/`
- Bloqqer preprocessor, version 37:
  `http://fmv.jku.at/bloqqer/`
- HQSpre preprocessor, version 1.3:
  `https://projects.informatik.uni-freiburg.de/projects/dqbf/files`

# DepQBF Variants with Preprocessors (5)

**Submitted Configurations:**

- Prenex CNF Track:
  1. depqbf-prefix-opt: standalone solver DepQBF without preprocessing except limited reverse-engineering of Tseitin encodings.
  2. depqbf-pre-QxQBH: combination of QBFRelay and depqbf-prefix-opt, where the letter code "QxQBH" indicates the use of the preprocessors QxBF, QRATPre+, Bloqqer, and HQSpre in QBFRelay.
- Hard-Instances Track:
  1. depqbf-pre-QxQBH, but with different parameter settings than the variant submitted to the prenex CNF track.

# Pre-DynDep: DynQBF, DepQBF, and Preprocessors (1)

**DynQBF:**

- Main developer: Günther Charwat.
- Expansion-based QBF solver for PCNF instances [Cha17, CW17].
- Version 1.1.1: `https://github.com/gcharwat/dynqbf/`
- CNF is split into subproblems by constructing a tree decomposition using htd [AMW17].
- QBF solved by dynamic programming over tree decomposition.
- Integration of dependency schemes via DepQBF.
- Nested sets of binary decision diagrams (BDDs) to efficiently store intermediate results.
- BDD handling with CUDD [Som15].

# Pre-DynDep: DynQBF, DepQBF, and Preprocessors (2)

**Submitted Configurations:**

- Prenex CNF Track:
  1. Pre-DynDep: combination of DynQBF, DepQBF, and QBFRelay, where QBFRelay includes the preprocessors QxBF, QRATPre+, Bloqqer, and HQSpre.

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