NAME

qbsolv – minimize the objective function represented by a QUBO

SYNOPSIS

qbsolv -i <input_file.qubo> [-o <output_file> [-w]] [-m] [-T <target_value>] [-t <num_seconds>] [-n <num_repeats>] [-S <subproblem_size>] [-v <verbosity_level>] [-q] [-V] [-h]

DESCRIPTION

qbsolv executes the quadratic unconstrained binary optimization (QUBO) problem in the specified file. It provides bit-vector results that minimize or, optionally, maximize the value of the objective function represented by the QUBO problem. **qbsolv** typically executes in a hybrid fashion on a classical CPU and a quantum processing unit (QPU).

The problem must be in the QUBO(5) file format and is not limited to the size (number of variables), connectivity pattern, or numerical precision of the D-Wave system on which it will be executed.

OPTIONS

-i <input_file.qubo>
Name of the file (relative or absolute pathname) containing the input QUBO. The ".qubo" extension is by convention.

-o <output_file>
Optional. Name of the file (relative or absolute pathname) to which qbsolv will write results. If no file is specified, results are written to standard output.

-w
Optional, in which case **-o** must also be specified. Prints the input QUBO matrix and the output result in .csv format to the specified output file.

-m
Optional. Specifies that **qbsolv** is to return the maximum value of the objective function instead of the minimum (default).

-T <target_value>

Optional. Target value of the objective function, expressed as an integer or floating-point number. When target value is reached, **qbsolv** stops the optimization process. Usually beneficial to specify only when the optimal value of the objective function has been analytically derived.

-t <num_seconds>

Optional. Number of seconds of elapsed CPU time consumed by the classically executing portion of **qbsolv** after which it stops the optimization process. The value may be specified as an integer or floating-point value. The elapsed CPU time is only checked after completion of the main loop, so the actual stop time may be more than the value. If options **-T** or **-n** are also specified, those limits may (depending on their values) stop **qbsolv** execution before the timeout is reached. The default value is 2,592,000.0 seconds (30 days).

-n <num_repeats>

Optional. Number of times that **qbsolv** is to repeat the main loop of the algorithm after a new optimal value is found. This value must be a positive integer. The default value is 40.

-S <subproblem_size>

Optional. Size of the subproblems into which **qbsolv** is to decompose the QUBO. Use **0** to allow qbsolv to use the most effective size for the target D-Wave system. The default value is 45. Any value greater than zero causes **qbsolv** to use its internal classical tabu solver instead of the D-Wave system.

-v <verbosity_level>

Optional. Level of verbosity of the output. Values are as follows:

- **0** (default) outputs the number of bits in the solution, the solution itself, and the energy of the solution.
- **1** outputs the same information as above for multiple solutions, if found.
- **2** outputs more detailed information at each step of the algorithm.

-q

Optional. Prints the format of an arbitrary QUBO file and exits without running the program.

-V

Optional. Prints the version number of the **qbsolv** program and exits without running the program.

-h

Optional. Prints the help message for **qbsolv** and exits without running the program.

BUGS

Report any bugs to dwsupport@dwavesys.com.

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SEE ALSO

qubo(5)