

NAME

*.e - embedding for mapping logical variables to qubit indices

DESCRIPTION

The **dw embed** subcommand from the D-Wave qOp package takes as input a QUBO and heuristically finds an embedding. The embedding is a map from each logical variable in the QUBO to a subset of physical qubits in the current geometry, subject to certain constraints. The current geometry is determined from the setting of the connection and solver which has been previously specified by the user. The output of the **dw embed** subcommand consists of two parts: the embedding and a parameterized QMI which implements the input QUBO. These data structures are stored in binary files in the user's current workspace.

If the user wishes to bypass the heuristic algorithm for finding an embedding but still needs to build the parameterized QMI, an optional embedding can be provided as input to the **dw embed** subcommand. In that case, the input embedding is specified in a text format file called the embedding file. The format of that embedding file is described here. In this case it is up to the user to determine a valid embedding for the input QUBO.

The QUBO input to **dw embed** contains logical variables. In an embedding file, each logical variable is mapped to one or more physical qubits. The set of physical qubit indices associated to a logical variable is represented in a single line of an embedding file. The logical variable name is the first token appearing on the line. It is followed by a colon character (:) and then by the physical qubit indices to which it maps. If the logical variable maps to multiple qubits, their indices should be separated by spaces. Optional spaces are also allowed on either side of the colon character.

In this example line from an embedding file, logical variable x3 is mapped to qubits 72, 75 and 119:

```
x3 : Q0072 Q0075 Q0119
```

An embedding file for a QUBO defined over N logical variables must contain at least N lines, one for each variable. Blank lines and lines beginning with a hash character (#) are ignored.

Here is a complete embedding file which maps a QUBO defined over logical variables x, y and z to one unit cell of the Chimera topology:

```
# Embed a three-variable QUBO into one unit cell
x : Q0000
y : Q0004
z : Q0001 Q0005
```

Qubit indices must be represented as **Qdddd** even if the qubit index can be expressed with fewer than four digits.

BUGS

Please report bugs to dwsupport@dwavesys.com.

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SEE ALSO

dw(1)