**A Novel Environment for Simulation of Quantum Computing**

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**QuIDE – Quantum IDE**

- Building and analysing quantum circuits and algorithms via source code and graphically
- Step-by-step execution with the step back option
- Preview of the actual internal quantum state

**QuIDE Performance**

Performance Results - The Memory Usage

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<th>jQuantum</th>
<th>QuIDE.dll</th>
<th>libquantum</th>
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</table>

**QuIDE Usability Evaluation**

- QuIDE was used during the Quantum Computation classes at DCS AGH
- The students assessed the usability with the System Usability Scale
- QuIDE was compared to libquantum

Official project website: [http://www.quide.eu/](http://www.quide.eu/)

**QuIDE User Interface**

- Users can generate the quantum circuit from the source code (1) as well as the source code from the circuit (4)
- The quantum circuit can be executed in the console (2) or evaluated step-by-step in the Run-Time Preview (3)
- The quantum gates in the circuit can be grouped into composite gates (6), which can be then ungrouped (5)
- A big set of predefined composite gates is available (7)

**Simulation of Shor’s Algorithm**

Shor’s Algorithm enables to factor numbers on quantum computer in polynomial time – it could thus compromise the RSA cryptosystem. Two optimization variants of the algorithm were implemented and compared.

Implemented optimization variants:

1. **1st Variant (7L + 3 qubits)**
2. **2nd Variant (2L + 3 qubits)**

*L* – number of bits of factored number

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