# CS 238 Quantum Programming
# A subset of QASM

Jens Palsberg

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For the homework *Implement a quantum circuit simulator*, we will use a subset of QASM programs that is defined by the following grammar. We use $n$ to range over nonnegative integers and we use $(\cdot)^*$ to denote Kleene-star, known from regular expressions.

(Program) $p$ ::= `OPENQASM 2.0;`
`include "qelib1.inc";`
`qreg q[` $n$ `];`
`creg c[` $n$ `];`
$s^*$

(Statement) $s$ ::= `h q[` $n$ `];`
| `x q[` $n$ `];`
| `t q[` $n$ `];`
| `tdg q[` $n$ `];`
| `cx q[` $n$ `]; q[` $n$ `];`

We have 14 benchmark programs that follow the above grammar:

| | | |
|---|---|---|
| `miller_11.qasm` | 3 qubits | 54 lines |
| `decod24-v2_43.qasm` | 4 qubits | 56 lines |
| `one-two-three-v3_101.qasm` | 5 qubits | 74 lines |
| `hwb5_53.qasm` | 6 qubits | 1,340 lines |
| `alu-bdd_288.qasm` | 7 qubits | 88 lines |
| `f2_232.qasm` | 8 qubits | 1,210 lines |
| `con1_216.qasm` | 9 qubits | 958 lines |
| `mini_alu_305.qasm` | 10 qubits | 177 lines |
| `wim_266.qasm` | 11 qubits | 990 lines |
| `cm152a_212.qasm` | 12 qubits | 1,225 lines |
| `squar5_261.qasm` | 13 qubits | 1,997 lines |
| `sym6_316.qasm` | 14 qubits | 274 lines |
| `rd84_142.qasm` | 15 qubits | 347 lines |
| `cnt3-5_179.qasm` | 16 qubits | 179 lines |