Quantum Computing and Symbolic Logic

David Greve david@thegreves.com

Why Is Quantum Computing Interesting?

- Not Just Faster
- New Complexity Class

• BQP



Primary Capabilities

- Superposition
 - System can be "in more than one state" at a time
 - Computation takes place uniformly over all states
- Entanglement
 - Inputs and Outputs are "correlated"
 - They will always be consistent
 - Provides "Function Inversion"



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Squint: Looks a lot like Symbolic Representation, Model Checking!

https://thegreves.com/david/QDD/qdd.html



Function Inversion: Sampling and State Space Collapse



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Sample

76



Function Inversion: Sampling and State Space Collapse

Amplify Probability of Desired Solution

- Before Sampling
- Filter Out Non-Solutions
- Grover's Algorithm

• Symbolic Logic

- Constrain Outputs to be 76 ..
- Only "3" remains as a satisfiable input assignment





Sampling Periodic: QFT



Lies They Like to Tell

- Exponential Space
 - Technically True: Size of the State Space
 - How do you use it?
 - Serial Write In
 - Read Out
 - Typically: Uniform Probability
- Parallel Computation
 - Executes Over All Possible Inputs
 - Only Get to Read One Output

