A speedrun for

Quantum-enhanced symmetric cryptanalysis for S-AES

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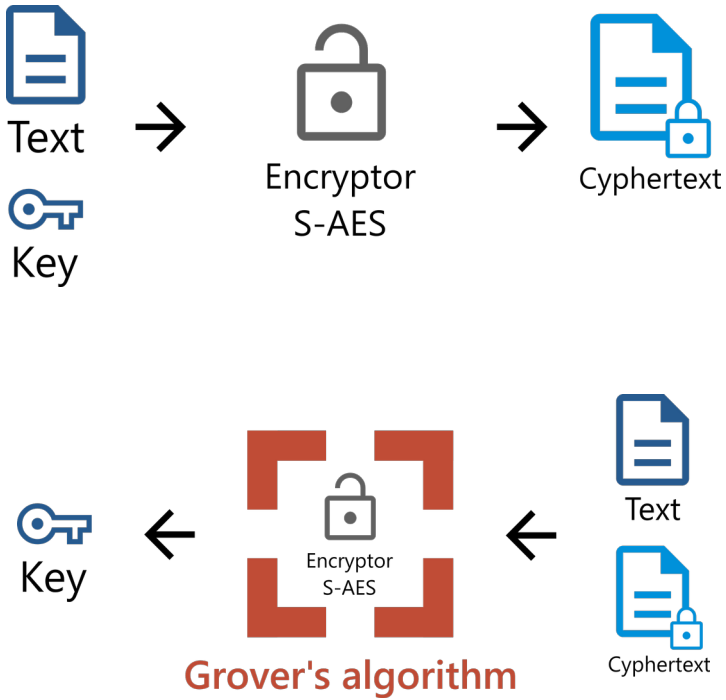
Grover’s algorithm



Quadratic speedup is provided

$O(2^n) \rightarrow O(2^{n/2})$

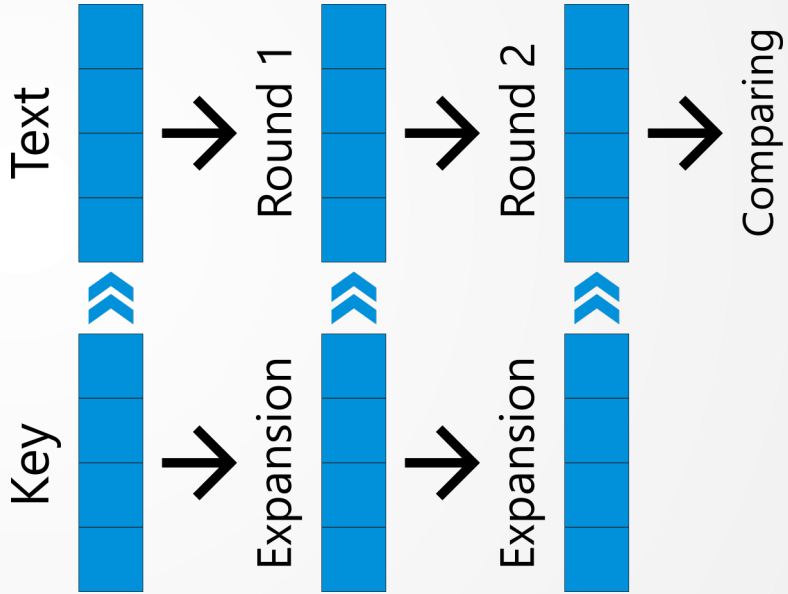
Twice longer key required

Standard encryption routine

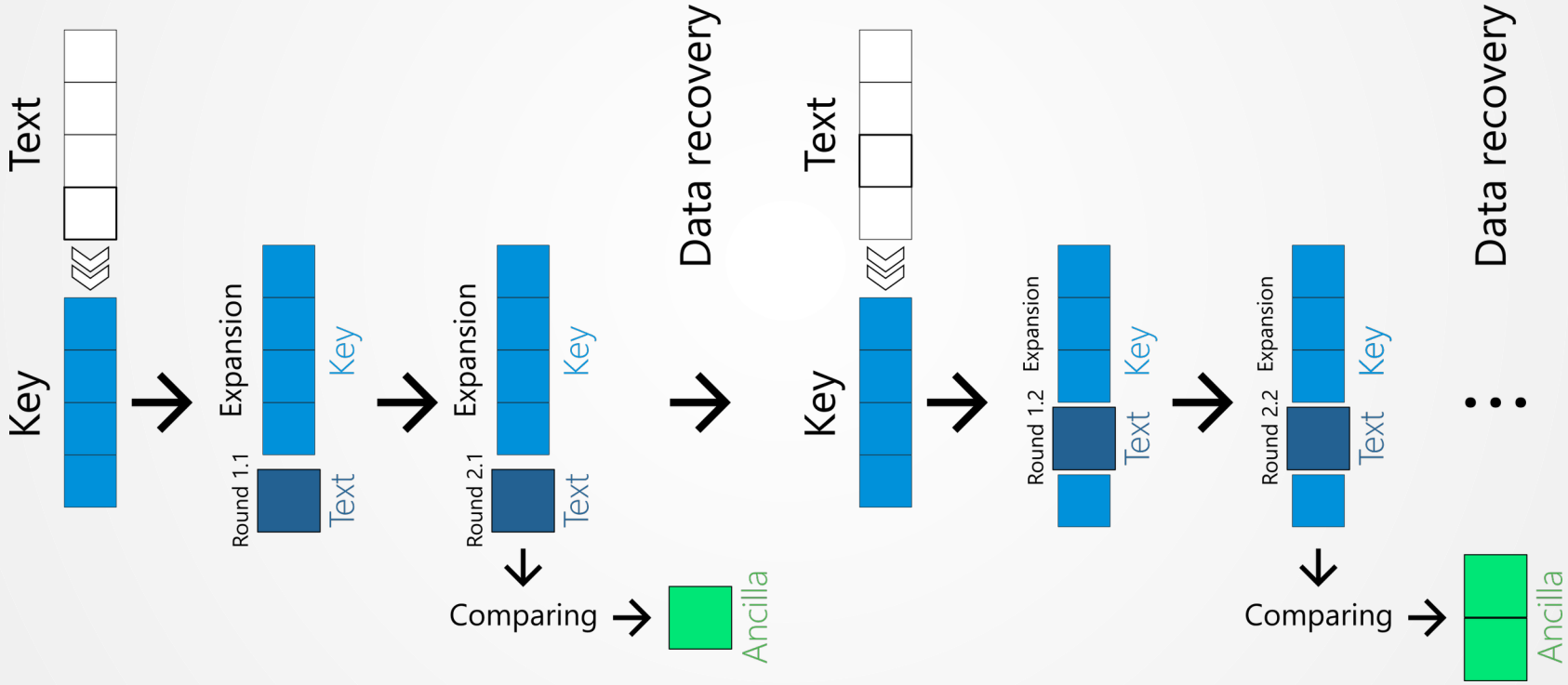
S-AES:

- 16-bit text
- 16-bit key
- 2 rounds

32 qubits – too many



Optimized encryption routine



Conclusions

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- 23 qubits for general attack
- 19, 17, 15 or 11 qubits for attack with partial key leak
- Few enough for GPU-accelerated simulations or data-center format QPU
- The new algorithm is scalable and can be adapted for full AES attack

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Thank you!

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