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It is clear to see that a quantum computer is more superior than a classical computer. There are certain tasks that a classical computer cannot execute without the need of absolute force. Factoring is one of them. A classical computer can only factorize small numbers, but it still requires a huge amount of force to execute this calculation. Thanks to Shor’s factoring algorithm for quantum computers, invented by American mathematician Peter Shor in 1994, larger numbers can now be factorized and do not require force in order to be executed. No one really knows what aspect of computing allows Shor’s algorithm to work faster than any possible algorithm for factoring. One aspect considered is entanglement. Classical computers are local and therefore require some time to resolve contingencies, this is not the case with quantum mechanics and so quantum computers have no need to resolve certain contingencies. Therefore, algorithms are executed twice as fast and larger numbers can be factorized. Inside a classical computer, atoms move around slowly and so tasks are performed at a slow rate. That is not the case with a quantum computer. Atoms move and change much quicker inside a quantum computer allowing each task that a classical computer executes to be performed faster. Atoms don’t follow the rules of physics as they can move forwards or backwards in time. They can be in two places at the same time and even have a chance of teleportation. This provides a huge advantage for quantum physics and future computing. Qubits are used in a quantum computer which causes exponential speedup and a larger number of calculations to be performed with ease. The two outcomes of measurement a qubit has is 1 and 0, the same as a bit. A bit can only have one of the two outcomes, but a qubit can have both and hence store twice as much information. This in turn allows a quantum computer to handle greater amounts of calculations and solve parallel problems at the same time.

There are so many pros with quantum computing, but what about the cons? There are pieces of technological equipment required for a quantum computer to be fully functional that is not yet available. Electrons are an essential element in quantum computing. Although there are some setbacks when working with electrons. When affected by the atmosphere they become damage and can no longer be used. We need a device that can prevent the damage caused to the electron in order to work with it. Scientists are working on that at the moment, but no breakthrough yet. It suddenly becomes clear about the amount of technological equipment required to produce a quantum computer, not to mention running it. With all this equipment cost is an obvious factor to consider. A large business could have the funds to use and run these computers and will have great benefits in the long run, but what about the small businesses? Even if they did have the funds to buy this product, they would have nothing to run it or even their own business. Quantum computers are just too expensive and could ruin the income a business produces. Above the cost and the equipment that we require, what about the people who will possess this machine? A quantum computer would have the ability to hack any network system in the entire world, and in the wrong hands, damage will be done. A classical computer does not possess the security required for the government or any large association. For example, if a terrorist had possession of this machine, they will have access to every network known to man. They could get access to nuclear codes, and no-one would know. They would be untraceable and cause mass destruction.

Computers are here to solve problems and the type of problems they solve depend on their hardware. Every kind of hardware type executes tasks of which it was built for. Quantum computers will be used to perform tasks that a classical computer cannot perform. A lot of online security depends on how large numbers are factorized into prime numbers. This can be done with a traditional computer, but it takes up a lot of valuable time. The valuable time lost is expensive and impractical. Quantum computers will have bigger and better algorithms to resolve these issues and then such online security methods will be possible without the time loss. New cryptography methods are being developed every year, though it may take some time before we find the right one, this will allow a more secure connection of networks and keep nuclear codes and private information safe. The weather can be very unpredictable, and we need advanced technology to assist. Classical computers require so many variables and performing the calculations take longer to solve than it takes for the weather to evolve. Quantum computers would give the exact measurements and time of when something will happen, like earthquakes and tsunamis. This ability to have better knowledge of the weather would benefit so many countries. It would allow more time to evacuate cities and help save lives and even agriculture. It is no doubt that modern markets are one of the most complicated systems. Although there are mathematical tools for this field there is still one problem. There is no control setting to run experiments. Investors wish to evaluate the distribution of outcomes under a large number of scenarios generated at random. Quantum computers can apply that element of randomness with a large quantity of numbers that a classical computer couldn’t. this would benefit investors and would prevent any biased and insecure information.

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https://github.com/annie2404/CS4182-project