QUANTUM COMPUTING -A SNEAK PEEK  
  
There is always a shortage of space when it comes to storage of data in the field of Computer Science. Code Optimisation, after a certain extent, doesn’t help you much in improving the efficiency of storing large amounts of data. What we need is a computing system that can store more information using minimum amount of space. In other words, we require a system that stores more information in one bit, rather than just 0 or 1.  
  
Welcome to the realm of Quantum Computing.  
  
Let us have a brief look at some of the basic concepts that have changed the field of Quantum Computing from a hypothesis to a reality. In May 1981, renowned scientist Richard Feynmans lecture on how a Quantum System can not simulate a classic system efficiently and his idea of the basic model of a Quantum Computer that could possibly do the same , revolutionised the idea of Quantum Computing. Later in 1985, David Deutsch, at the University of Oxford, described a Quantum Computer by extending the definition of a Universal Turing Machine. Just like how a Universal Turing Machine can simulate any other Turing Machine, a Universal Quantum Computer can simulate any other set of Quantum Computers. This provided an insight towards how Quantum Computers are supposed to work and the efficiency of their operation. An important contribution was made by Tomasso Toffoli in 1981 when he first introduced the reversible Toffoli gate. The Toffoli gate is a device used for computation, having 3 bit input and output. If the first two bits are set, then the third bit is inverted. Else, all the bits stay the same way. In the year 1998, the first working 3 qubit(quantum bit) NMR(Nuclear Magnetic Resonance) computer was demonstrated.Recently, on January 24th 2017, D-Wave Systems Inc. has announced the commercial availability of their D-Wave 2000Q, a 2000 qubit Quantum Computer.  
  
Concept and Working of a Quantum Computer:   
Discussing the topic on a quantum level, it uses the superposition principle to compute the state of its qubits. Therefore at any given time, a qubit can have a value of either 0 or 1 or both 0 and 1 simultaneously. This considerably reduces the look up overhead during the event of solving iterative problems and frees the user from binary constraints. Since a quantum system is also diffferent from a classical system, the constituent qubits may not be independent of each other. This phenomenon is called quantum bit entanglement which is a direct result of the quantum entanglement. And all the qubits have a correlation with other qubits because of the entanglement phenomenon. This means that , if there are n qubits there are 2 to the power n possible correlations between the qubits. Now since it is not possible to just write down all these 2 to the power n possible combinations, a Quantum Computer is used to record all these correlations in such a way that they make sense.  
  
Therefore, the basic idea is to increase the amount of information stored in one bit, since each bit is correlated to some other bit holding additional information by courtesy of the entanglement phenomenon. However, there is just one problem. The input given to a quantum computer can be entangled qubits in the state of superposition, the output produced by the Quantum Computing System is also of the same nature. Entangled qubits in the state of superposition. Which means that the output will change even before one can observe the same. Even though the output produced will never be able to describe the state of the qubits accurately, it is able to describe the manner in which the qubits behave as they are correlated to each other. This means more information in less number of units to store the information. This can be verified from various algorithms devised for Quantum Computing Systems like the Deutsch Josza algorithm. Since a Quantum Computing system has the capability to process large amounts of information faster than its classical counterpart, it can considerably reduce the storage space required for the same upto a significant level. There are talks of a powerful computing system such as this revolutionizing the Virtual Reality industry by 2050. It’s ability can also be utilised in the field of gaming and it can deliver a tremendous transformation in the field of Artificial Intelligence(AI).  
  
The dawn of a new era in Computer Science has begun.

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