QUANTUM COMPUTING

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- **Quantum Computer:**
  - A computer that uses quantum mechanical phenomena to perform operations on data through devices such as superposition and entanglement.
  - In Quantum Computing, a qubit or quantum bit is the basic unit of quantum information - the quantum version of the classic binary bit physically realized with a two-state device.
- **Classical Computer (Binary)**
  - A computer that uses voltages flowing through circuits and gates, which can be calculated entirely by classical mechanics.

ADVANTAGES OF QUANTUM COMPUTING

- **Advantages of Quantum computing :**
  - A **quantum computer** is "thousands of times" **faster than** a conventional **computer**.
  - Rather than use more electricity, quantum computers will reduce power consumption anywhere from 100 up to 1000 times.
- **Disadvantages of Quantum Computing:**
  - Quantum computers are very fragile. Any kind of vibration impacts the atoms and causes decoherence.
  - In order to keep quantum computers stable, they need to be cold.

APPLICATIONS OF QUANTUM COMPUTING

- **Applications Of Quantum computing :**
- Cybersecurity
- Drug Development
- Financial Modeling
- Better Batteries
- Cleaner Fertilization
- Traffic Optimization
- Weather Forecasting and Climate Change
- Artificial Intelligence
- Solar Capture
- Electronic Materials Discovery

TPU

- **TPU stands for Tensor Processing Unit**
- Tensor Processing Units (TPUs) are Google's custom-developed application-specific integrated circuits (ASICs) used **to accelerate machine learning workloads.**
- TPUs are designed from the ground up with the **benefit** of Google's deep experience and leadership in **machine learning**.

ADVANTAGES OF TPU

- Cloud TPU resources **accelerate the performance** of linear algebra computation, which is used heavily in machine learning applications.
- Models that previously took weeks to train on other hardware platforms can converge in hours on TPUs.

CPU,GPU AND TPU COMPARISON

CPU	GPU	TPU
CPU stands for Central Processing Unit	**GPU** stands for Graphical Processing Unit	**TPU** stands for Tensor Processing Unit
CPU Manage all the functions of a computer.	**GPU** is an additional processor to enhance the graphical interface and run high-end tasks.	**TPUs** are powerful custom-built processors to run the project made on a specific framework, i.e. TensorFlow.
CPU suited for, small models, small datasets and useful for design space exploration	**GPU** suited for Medium to large models, datasets, image, video processing	**TPU** suited for Matrix computations, dense vector processing