Federated learning is a collaborative approach to training machine learning models without sharing raw data. As Fig. 1 shows, instead of collecting data in one central location, the model is sent to multiple devices or servers where local data resides. Each device trains the model on its own data and sends only the model updates back to a central server. The server then combines these updates to improve the global model, which is redistributed to the devices for further training. This cycle repeats until the model reaches desired performance. Federated learning preserves privacy by keeping data local, allows learning from diverse data sources, and enables model improvement without direct access to sensitive information.

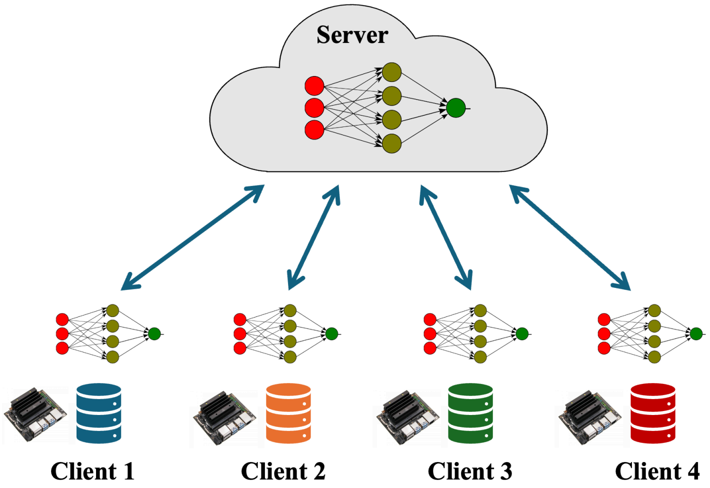

Fig. 1: Federated Learning

In this project, we aim to demonstrate a federated learning system comprising:

- **Clients:** Each client uses a compact GPU module to train a local model on its own dataset.

- **Server:** A cloud platform (e.g., Amazon Web Services, Google Cloud,…) or a single computer in a simpler scenario serves as the server.

- **Connections:** All clients connect to the server. Clients send their local models to the server, which aggregates them to generate a global model. The server then distributes this global model back to all clients. This cycle repeats until the desired performance is achieved.