Cloudrone: Micro Clouds in the Sky

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**Cloudrone**

Users access the services from the ground.

**System Design**

![Diagram of Cloudrone system design](image)

- **Mobile Phone** (Connects to ROS master using ROSjava app, sends video feed and GPS data)
- **Smartphone/Laptop/Tablet** (Accesses services through WiFi)
- **Base Station/Laptop** (Runs ROS Master, GUI)
- **Gaming Joystick** (Controls the quadcopter and selects modes)
- **ESC and Motor** (Clockwise)
- **ESC and Motor** (Anti-Clockwise)
- **PWM**
- **WiFi Hotspot**

**Scaling up the number of deployed containers within a PI**

- Using a nano web server (size is less than 90 KB).
- Using systat to measure memory consumption, CPU utilisation and creation time
- **Key takeaway message:** A single PI (PI 2 model B) can support significant amount of concurrent lightweight services.

![Graph of container scaling](image)

**Scaling up the number of users accessing a single service**

- Using the Ab - Apache HTTP server
- Scaling concurrent users from 10 to 250
- 10 000 transactions per experiment
- **Key takeaway message:** A Docker container running on a single PI (PI 2 model B) can support significant amount of concurrent users

![Graph of user scaling](image)

**Cloudrone’s Challenges**

- **Scalability**
  - Heavier services (e.g., Openstreetmaps)
  - Load balancing techniques such as application layer anycast
- **Service Retrieval**
  - How to identify the location of the services across a mesh of drones?
  - Exploit techniques such as mDNS
  - Integrate with ICN such as NDN, SCANDEX (A.Sathiaseelan, Mobisys-DIY’15)
- **Deployment Issues**
  - Need innovative battery technology (e.g., hydrogen powered)
  - There are tight regulations in flying drones

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