Raspberry Pi 5 Project Manual

This manual will guide you through setting up a Raspberry Pi 5 from scratch, installing the necessary tools, and deploying two projects: 1) a real-time chatroom, and 2) a self-hosted photo service. The instructions are written for beginners with no prior Raspberry Pi experience.

Chapter 1: Raspberry Pi Setup 1. Download Raspberry Pi OS (64-bit) from the official Raspberry Pi website.
2. Flash the OS image to a microSD card using Raspberry Pi Imager.
3. Insert the microSD card into your Raspberry Pi 5 and power it on.
4. Connect keyboard, mouse, and monitor for initial setup.
5. Set up Wi-Fi or Ethernet, choose a password, and update the OS with:
sudo apt update && sudo apt upgrade -y
6. Enable SSH to allow remote access:
sudo raspi-config → Interface Options → SSH → Enable.
7. Find your Pi's IP address with:
hostname -I.
8. From another computer, connect via SSH:
ssh pi@<your_ip> (default username: pi, password: raspberry).

Chapter 2: Install Docker & Docker Compose 1. Install Docker:
curl -fsSL https://get.docker.com -o get-docker.sh
sh get-docker.sh
2. Add your user to Docker group:
sudo usermod -aG docker pi
3. Log out and back in for permissions to take effect.
4. Install Docker Compose:
sudo apt install docker-compose -y.

Chapter 3: Networking Setup 1. Use a static IP or configure port-forwarding on your router for ports 80/443.
2. If you cannot port-forward, use Cloudflare Tunnel or DuckDNS for dynamic DNS.
3. Optional: Set up WireGuard VPN to access your Pi privately.

Chapter 4: Chatroom Project 1. Clone your chatroom project repository:
git clone https://github.com/yourname/pi-chat.git
2. Navigate into the project folder:
cd pi-chat
3. Build and start the containers:
docker compose up --build -d
4. Verify the service is running:
docker ps
5. Access the chatroom in your browser at:
http://<your_pi_ip>:8080.
6. To use a custom domain with HTTPS, configure Caddy with DuckDNS or Cloudflare.

Chapter 5: Photo Hosting Project For photos, we'll use Immich, a self-hosted photo service (similar to Google Photos).

1. Clone the Immich Docker setup:
git clone https://github.com/immich-app/immich
2. Enter the Immich directory:
cd immich
3. Edit the .env file to set database passwords and storage paths.
4. Start the containers:

docker compose up -d
5. Access Immich at:
http://<your_pi_ip>:2283.
6. Download the Immich mobile app for automatic photo backup.

Chapter 6: Maintenance 1. Update containers regularly:
docker compose pull && docker compose up -d
2. Backup important data (Postgres databases, volumes).
3. Monitor logs with:
docker logs <container_name>.
4. Secure your Pi with strong passwords and keep it updated.

With this setup, your Raspberry Pi 5 runs two full projects: a real-time chatroom and a personal photo cloud. You can now expand into other services such as Jellyfin (media server), Pi-hole (ad blocking), or Gitea (self-hosted Git).