AI-03941 GCP DockerLab Problem Optimization

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Cleanup Commands

```
docker stop $(docker ps -q)
docker rm $(docker ps -aq)
docker network prune -f
docker rmi $(docker images -q)
docker system prune -a --volumes -f
docker ps -a
docker images
docker network ls
```

To transition from a "partially working" setup into a clean, professional, and modular DockerLab, we need to restructure how your containers talk to each other.

Currently, your setups are colliding because multiple files are fighting to control the same host ports (like `80` and `443`) or are completely isolated in their own private networks. By moving to a **shared-service modular architecture**, you will be able to turn individual applications on and off without accidentally killing your databases or breaking your reverse proxy.

The Architecture Philosophy: "Shared vs. Individual"

To keep things truly modular, we will separate your lab into two categories of directories:

1. **Shared Infrastructure:** Services that stay online all the time (Networks, Databases, Reverse Proxy, Management tools).
2. **Individual Apps:** Applications that connect to the shared infrastructure but can be brought up/down independently.

Every application will be completely stripped of its raw database blocks and host port bindings. Instead, they will communicate entirely over an internal Docker network, using **Nginx Proxy Manager (NPM)** as the sole front gate to the outside world.

Step 1: Laying the Directory Foundation

Log into your GCP instance terminal and create a clean directory tree. This enforces the exact modularity you are looking for:

Bash

```
mkdir -p ~/dockerlab/{infrastructure,apps/wordpress,apps/inventree,apps/openproject,apps/openemr}
```

Step 2: The Core Network & Infrastructure Stack

Instead of defining your shared databases inside each application file, we will group them together. Move into your infrastructure folder:

Bash

```
cd ~/dockerlab/infrastructure
```

Create a central `.env` file (`nano .env`) to securely store your passwords instead of hardcoding them inside the compose blueprints.

`~/dockerlab/infrastructure/.env`

Code snippet

```
DB_ROOT_PASSWORD=ChooseAStrongRootPassword123!
WORDPRESS_DB_PASSWORD=WpSecurePass321!
INVENTREE_DB_PASSWORD=InventreeSecurePass456!
OPENPROJECT_DB_PASSWORD=p4ssw0rd
OPENEMR_DB_PASSWORD=OpenEmrPass789!
PGADMIN_PASSWORD=SecurePgAdminPassword!
```

Next, create the core orchestration file (`nano docker-compose.yml`). This file handles your database backends, proxy, and management tools, all tethered to a unified network.

`~/dockerlab/infrastructure/docker-compose.yml`

YAML

```
version: '3.8'

networks:
  dockerlab-network:
    name: dockerlab-network
    driver: bridge

services:
  # --- THE GATEKEEPER ---
  npm:
    image: 'jc21/nginx-proxy-manager:latest'
    container_name: npm
    restart: unless-stopped
    ports:
      - '80:80'    # Handles all incoming HTTP traffic
      - '443:443'  # Handles all incoming HTTPS traffic
      - '81:81'    # NPM Management UI
    volumes:
      - ./npm/data:/data
      - ./npm/letsencrypt:/etc/letsencrypt
    networks:
      - dockerlab-network

  # --- MANAGEMENT UI's ---
  portainer:
    image: portainer/portainer-ce:latest
    container_name: portainer
    restart: unless-stopped
    volumes:
      - /var/run/docker.sock:/var/run/docker.sock
      - ./portainer/data:/data
    networks:
      - dockerlab-network
    # Note: We removed port 9000 exposure. You will access Portainer securely via NPM.

  pgadmin:
    image: dpage/pgadmin4:latest
    container_name: pgadmin
    restart: unless-stopped
    environment:
      PGADMIN_DEFAULT_EMAIL: admin@blindcaveman.duckdns.org
      PGADMIN_DEFAULT_PASSWORD: ${PGADMIN_PASSWORD}
      PGADMIN_LISTEN_PORT: 80
    volumes:
      - ./pgadmin/data:/var/lib/pgadmin
    networks:
      - dockerlab-network

  phpmyadmin:
    image: phpmyadmin:latest
    container_name: phpmyadmin
    restart: unless-stopped
    environment:
```

```
      PMA_ARBITRARY: 1
      PMA_HOSTS: mariadb-shared,postgres-shared
    networks:
      - dockerlab-network

  # --- SHARED DATABASES ---
  mariadb-shared:
    image: mariadb:11.8
    container_name: mariadb-shared
    restart: unless-stopped
    command: ['mariadbd','--character-set-server=utf8mb4']
    volumes:
      - ./mysql_data:/var/lib/mysql
    environment:
      MYSQL_ROOT_PASSWORD: ${DB_ROOT_PASSWORD}
    networks:
      - dockerlab-network

  postgres-shared:
    image: postgres:17
    container_name: postgres-shared
    restart: unless-stopped
    volumes:
      - ./postgres_data:/var/lib/postgresql/data
    environment:
      POSTGRES_PASSWORD: ${DB_ROOT_PASSWORD}
    networks:
      - dockerlab-network
```

Why we designed it this way: * `mariadb-shared` and `postgres-shared` have **no host ports exposed** (e.g., no `3306:3306`). This prevents bad actors scanning GCP IP ranges from attacking your raw databases. They are safe inside the virtual network.

- `dockerlab-network` is explicitly named. This allows other compose files on your machine to "attach" to it seamlessly.

Launch this stack first:

Bash

```
docker compose up -d
```

Step 3: Transitioning Applications to the Modular Layout

Now that your network and databases are permanently online, you can build your application directories. Instead of bundling databases inside these files, we point them to the central infrastructure containers.

App 1: WordPress

Bash

```
cd ~/dockerlab/apps/wordpress
```

Create a `docker-compose.yml` that links directly back to the shared MariaDB container.

YAML

```
version: '3.8'

services:
  wordpress:
    image: wordpress:latest
    container_name: wordpress-server
    restart: unless-stopped
    environment:
      WORDPRESS_DB_HOST: mariadb-shared  # Points to the container in the shared stack
      WORDPRESS_DB_USER: root
      WORDPRESS_DB_PASSWORD: ChooseAStrongRootPassword123! # Matches DB_ROOT_PASSWORD
      WORDPRESS_DB_NAME: wordpress
    volumes:
      - ./wp_data:/var/www/html
    networks:
      - dockerlab-network

networks:
  dockerlab-network:
    external: true # Tells Docker not to create a network, but find the existing one
```

App 2: InvenTree

Bash

```
cd ~/dockerlab/apps/inventree
```

Your original file had serious port conflicts (claiming 80/443 via Caddy) and a localized network loop. Here is how we adapt your setup to connect to the external network safely, allowing Caddy to handle internal data serving while NPM handles external traffic.

Make sure you copy your existing `Caddyfile` and `.env` files into this directory. Then use this optimized blueprint:

YAML

```
version: '3.8'

services:
  inventree-cache:
    image: redis:7-alpine
    container_name: inventree-cache
    env_file: - .env
    networks:
      - dockerlab-network
    restart: always

  inventree-server:
    image: inventree/inventree:${INVENTREE_TAG:-stable}
    container_name: inventree-server
    # REMOVED: Port 8000 host mapping to secure Gunicorn inside the network layer
    depends_on:
      - inventree-cache
    env_file:
      - .env
    environment:
      - INVENTREE_DB_HOST=postgres-shared # Redirects to core Postgres
    volumes:
      - ${INVENTREE_EXT_VOLUME}:/home/inventree/data:z
    networks:
      - dockerlab-network
    restart: unless-stopped

  inventree-worker:
    image: inventree/inventree:${INVENTREE_TAG:-stable}
    container_name: inventree-worker
    command: invoke worker
    depends_on:
      - inventree-server
    env_file:
      - .env
    volumes:
      - ${INVENTREE_EXT_VOLUME}:/home/inventree/data:z
    networks:
      - dockerlab-network
    restart: unless-stopped

  inventree-proxy:
    container_name: inventree-proxy
    image: caddy:alpine
    restart: always
    depends_on:
      - inventree-server
    # REMOVED: Ports 80:80 and 443:443 to resolve the clash with NPM
    env_file:
      - .env
    volumes:
```

```
      - ./Caddyfile:/etc/caddy/Caddyfile:ro,z
      - ${INVENTREE_EXT_VOLUME}/static:/var/www/static:z
      - ${INVENTREE_EXT_VOLUME}/media:/var/www/media:z
    networks:
      - dockerlab-network

networks:
  dockerlab-network:
    external: true
```

Step 4: Connecting the Dots via Nginx Proxy Manager

Now that your infrastructure is up and your applications are separated, how do you actually reach them using your domain `blindcaveman.duckdns.org`?

1. Open your web browser and navigate to `http://<Your-GCP-VM-IP>:81` to log into Nginx Proxy Manager.
2. Default credentials are: Email: `admin@example.com` | Password: `changeme` (NPM will immediately prompt you to update these).
3. Go to **Hosts** → **Proxy Hosts** → **Add Proxy Host**.

To map your applications over the shared network, use the internal container names and their internal network ports:

Desired Subdomain	Forward Hostname / IP	Forward Port	Open SSL Tab & Request Cert?
`portainer.blindcaveman.duckdns.org`	`portainer`	`9000`	Yes
`pgadmin.blindcaveman.duckdns.org`	`pgadmin`	`80`	Yes
`phpmyadmin.blindcaveman.duckdns.org`	`phpmyadmin`	`80`	Yes
`wordpress.blindcaveman.duckdns.org`	`wordpress-server`	`80`	Yes
`inventree.blindcaveman.duckdns.org`	`inventree-proxy`	`80`	Yes

Because NPM shares the `dockerlab-network` with all of these containers, it acts like a DNS server. It resolves the name `inventree-proxy` or `wordpress-server` automatically and securely routes web requests without exposing any broken or messy port configurations to your host system.

Troubleshooting / Learning Takeaways

- **Independent Management:** You can now safely run `docker compose down` inside `~/dockerlab/apps/wordpress` to tweak things. Your InvenTree app, core MariaDB database, and NPM proxy will remain perfectly untouched.
- **Database Preparation:** When connecting applications to a shared database engine for the first time, make sure you log into pgAdmin or phpMyAdmin to create the empty database schemas (e.g., `wordpress`, `inventree`, `openproject`) so the applications have a target database to initialize their tables into upon startup!

Here are the missing modular `docker-compose.yml` configurations for **OpenProject** and **OpenEMR**, tailored to plug directly into the unified shared-service infrastructure we established.

Like the others, we have stripped out their internal database blocks, removed conflicting host port bindings, and attached them to the external `dockerlab-network`.

🏗️ App 3: OpenProject Configuration

OpenProject uses a complex web of services (web, background workers, cron, and a sync server called Hocuspocus). This setup bridges all of them into your shared PostgreSQL database while reusing your existing configuration parameters.

1. File Setup

Navigate to your OpenProject directory:

Bash

```
mkdir -p ~/dockerlab/apps/openproject
cd ~/dockerlab/apps/openproject
```

Create your `.env` file (`nano .env`) and paste your exact environment settings from `openproject-.env`, but **update the database URL** to point to your central PostgreSQL container:

Code snippet

```
TAG=17-slim
OPENPROJECT_HTTPS=true
OPENPROJECT_HOST__NAME=blindcaveman.duckdns.org
OPENPROJECT_HSTS=true
```

```
PORT=8080

SECRET_KEY_BASE=a3f9e2b8c7d6e5f4a3b2c1d0e9f8a7b6c5d4e3f2a1b0c9d8e7f6a5b4c3d2e1f0
COLLABORATIVE_SERVER_SECRET=7f6e5d4c3b2a10fe9d8c7b6a5f4e3d2c1b0a9f8e7d6c5b4a3f2e1d0c9b8a7f6e
COLLABORATIVE_SERVER_URL=wss://blindcaveman.duckdns.org/hocuspocus

PGDATA=pgdata
OPDATA=opdata

IMAP_ENABLED=false
RAILS_MIN_THREADS=4
RAILS_MAX_THREADS=16

# CHANGED: Points to your central postgres-shared container instead of a local 'db' service
DATABASE_URL=postgres://postgres:ChooseAStrongRootPassword123!@postgres-shared/openproject?pool=20&encoding=unicode&reconnect=true
```

2. The Compose Blueprint (`nano docker-compose.yml`)

This is the modernized version of `openproject-docker-compose.yml`. The proxy service and the local database have been stripped out because Nginx Proxy Manager handles the routing natively.

YAML

```
version: "3.8"

networks:
  dockerlab-network:
    external: true

volumes:
  opdata:

x-op-restart-policy: &restart_policy
  restart: unless-stopped

x-op-image: &image
  image: openproject/openproject:${TAG}

x-op-app: &app
  <<: [*image, *restart_policy]
  environment:
    OPENPROJECT_HTTPS: "${OPENPROJECT_HTTPS}"
    OPENPROJECT_HOST__NAME: "${OPENPROJECT_HOST__NAME}"
    OPENPROJECT_ADDITIONAL__HOST__NAMES: "openproject"
    OPENPROJECT_HSTS: "${OPENPROJECT_HSTS}"
    OPENPROJECT_RAILS__CACHE__STORE: "memcache"
    OPENPROJECT_CACHE__MEMCACHE__SERVER: "cache:11211"
    OPENPROJECT_COLLABORATIVE__EDITING__HOCUSPOCUS__URL: "${COLLABORATIVE_SERVER_URL}"
    OPENPROJECT_COLLABORATIVE__EDITING__HOCUSPOCUS__SECRET: "${COLLABORATIVE_SERVER_SECRET}"
```

```
    DATABASE_URL: "${DATABASE_URL}"
    RAILS_MIN_THREADS: ${RAILS_MIN_THREADS}
    RAILS_MAX_THREADS: ${RAILS_MAX_THREADS}
    IMAP_ENABLED: "${IMAP_ENABLED}"
    SECRET_KEY_BASE: "${SECRET_KEY_BASE}"
  volumes:
    - opdata:/var/openproject/assets
  networks:
    - dockerlab-network

services:
  cache:
    image: memcached:alpine
    <<: *restart_policy
    networks:
      - dockerlab-network

  web:
    <<: *app
    container_name: openproject-web
    command: "./docker/prod/web"
    hostname: "${OPENPROJECT_HOST__NAME}"
    depends_on:
      - cache
      - seeder
    labels:
      - autoheal=true
    healthcheck:
      test: ["CMD", "curl", "-f", "http://localhost:8080/health_checks/default"]
      interval: 10s
      timeout: 3s
      retries: 3
      start_period: 30s

  autoheal:
    image: willfarrell/autoheal:1.2.0
    <<: *restart_policy
    volumes:
      - "/var/run/docker.sock:/var/run/docker.sock"
    environment:
      AUTOHEAL_CONTAINER_LABEL: autoheal
      AUTOHEAL_START_PERIOD: 600
      AUTOHEAL_INTERVAL: 30
    networks:
      - dockerlab-network

  worker:
    <<: *app
    command: "./docker/prod/worker"
    depends_on:
      - cache
      - seeder

  cron:
```

```
    <<: *app
    command: "./docker/prod/cron"
    depends_on:
      - cache
      - seeder

  seeder:
    <<: *app
    command: "./docker/prod/seeder"
    restart: on-failure

  hocuspocus:
    image: openproject/hocuspocus:17.5.0
    <<: *restart_policy
    environment:
      SECRET: "${COLLABORATIVE_SERVER_SECRET}"
      OPENPROJECT_URL: "http://openproject-web:8080"
      OPENPROJECT_HTTPS: "${OPENPROJECT_HTTPS}"
    networks:
      - dockerlab-network
```

🏥 App 4: OpenEMR Configuration

OpenEMR originally shipped with its own dedicated MariaDB instance and exposed ports `801` and `4431`. In our clean layout, we route it to your central `mariadb-shared` container and drop the host port exposures.

1. File Setup

Navigate to your OpenEMR directory:

Bash

```
mkdir -p ~/dockerlab/apps/openemr
cd ~/dockerlab/apps/openemr
```

2. The Compose Blueprint (`nano docker-compose.yml`)

This rewrites the raw parameters from `openemr-docker-compose.yml` to fit your modular blueprint:

YAML

```
version: '3.8'

services:
```

```
  openemr:
    restart: always
    image: openemr/openemr:7.0.5
    container_name: openemr-server
    # REMOVED: ports mapping (801:80, 4431:443) to hand routing over to NPM
    volumes:
      - openemr-logs:/var/log
      - openemr-sites:/var/www/localhost/htdocs/openemr/sites
    environment:
      MYSQL_HOST: mariadb-shared             # Point to your core infrastructure database cont
ainer
      MYSQL_ROOT_PASS: ChooseAStrongRootPassword123! # Matches DB_ROOT_PASSWORD from infrastru
cture
      MYSQL_USER: openemr
      MYSQL_PASS: OpenEmrPass789!
      OE_USER: admin
      OE_PASS: pass
    networks:
      - dockerlab-network

volumes:
  openemr-logs:
  openemr-sites:

networks:
  dockerlab-network:
    external: true
```

🚦 Step-by-Step Deployment Instructions

Before bringing these applications online, you must create empty database targets so the apps have somewhere to write data when they initialize.

Step 1: Initialize Database Schemas

1. Open **phpMyAdmin** in your browser via your proxy.
2. Select your `mariadb-shared` server, navigate to the **Databases** tab, and create a new database named `openemr`.
3. Open **pgAdmin** in your browser.
4. Connect to your `postgres-shared` server, right-click **Databases** → **Create** → **Database...**, and name it `openproject`.

Step 2: Launch the Applications

Now go into your respective folders and run your compose commands. They will automatically latch on to your running infrastructure.

Bash

```
# Launch OpenProject
cd ~/dockerlab/apps/openproject
docker compose up -d

# Launch OpenEMR
cd ~/dockerlab/apps/openemr
docker compose up -d
```

Step 3: Configure Proxy Routes in Nginx Proxy Manager

Go to your NPM dashboard (`http://<GCP-VM-IP>:81`) and create your Proxy Hosts so your DuckDNS subdomains resolve to your newly isolated application structures:

Domain / Subdomain	Forward Hostname / IP	Forward Port	Open SSL Tab & Request Cert?
`openproject.blindcaveman.duckdns.org`	`openproject-web`	`8080`	Yes
`openemr.blindcaveman.duckdns.org`	`openemr-server`	`80`	Yes

🧠 The Educational Value Checklist

- **Want to run updates on OpenProject?** You can change the version tag in `~/dockerlab/apps/openproject/.env` and run `docker compose down && docker compose up -d` safely inside that directory. Your medical dashboard (OpenEMR) and primary website (WordPress) will remain online without a second of interruption.
- **Troubleshooting Logs:** If OpenEMR throws a database connection error during initialization, you can run `docker logs openemr-server` to trace the network bridge handshake.

Provide a **detailed system overview of** `wordpress-docker-vm`. This environment is part of a modular **DockerLab**, where multiple Docker applications have already been deployed. The current objective is **cleanup, documentation, and infrastructure rationalization**.

Perform a complete assessment of the `wordpress-docker-vm` stack and produce a structured inventory of all inner components and dependencies.

Scope of Analysis

Analyze and document the following:

1. **Container Inventory**
    - List all running and stopped containers related to `wordpress-docker-vm`
    - Container names, images, versions, restart policies, uptime, and health status
    - Relationship and dependency between containers
2. **Database Discovery**
    - Identify all databases used by WordPress
    - Database engine/type (e.g., MySQL, MariaDB, PostgreSQL)
    - Database container name
    - Database hostname, internal Docker network hostname, and exposed ports
    - Database credentials source (environment variables, secrets, `.env`, compose file)
    - Database storage location (Docker volumes, bind mounts, filesystem paths)
    - Database size and active schemas/tables
3. **Docker Networking**
    - Enumerate all Docker networks connected to `wordpress-docker-vm`
    - Network names, subnets, gateways, drivers, and attached containers
    - Internal container communication paths
    - DNS/service discovery mappings inside Docker
    - External ingress/egress pathways
4. **Port Mapping & Exposure**
    - Document all exposed ports
    - Internal container ports vs host-mapped ports
    - Reverse proxy integration (if applicable)
    - Domain mappings and routing configuration
    - SSL/TLS termination points

5. **Application Stack Mapping**
    - Identify all applications running inside the WordPress stack
    - Web server layer (Apache, Nginx, Traefik, etc.)
    - PHP runtime version and configuration
    - WordPress version
    - Plugins, themes, and custom modifications (if accessible)
    - Persistent storage paths and mounted volumes
6. **Storage & Volume Mapping**
    - Docker volumes associated with WordPress
    - Bind mounts and filesystem locations
    - Persistent data paths
    - Orphaned or unused volumes that may be candidates for cleanup
7. **Environment Configuration**
    - Parse `docker-compose.yml`
    - Inspect `.env` files
    - Extract environment variables relevant to WordPress and database connectivity
    - Detect hardcoded credentials, deprecated settings, or redundant configuration
8. **Resource Utilization**
    - CPU, RAM, disk consumption by containers
    - Container sizing observations
    - Potential inefficiencies or cleanup opportunities
9. **Cleanup Assessment**
    - Identify unused containers, dangling images, orphaned volumes, unused networks, and stale configurations
    - Highlight risks before removal
    - Recommend a safe cleanup strategy

Expected Output Format

Part 1 — Text-Based System Overview

Provide a structured, human-readable report including:

- Executive Summary
- Container Architecture
- Database Architecture
- Network Topology
- Port Exposure Table
- Storage & Volume Mapping
- Dependency Relationships
- Environment Variable Summary
- Resource Utilization
- Cleanup Recommendations
- Risks / Warnings

Part 2 — Visual Diagram

Generate a **clear architectural diagram** of `wordpress-docker-vm` showing:

- Docker host / VM
- WordPress container(s)
- Database container(s)
- Networks
- Volumes
- Reverse proxy (if applicable)
- Port mappings
- Internal communication flow
- External access path (`domain → reverse proxy → WordPress → DB`)

The diagram should include both:

1. **High-level architecture view**
2. **Inner component/dependency diagram**

Use arrows and labels to clearly illustrate container relationships, storage, and networking.

Google Cloud Environment Assessment Report: `wordpress-docker-vm`

Part 1 — Technical System Overview & Assessment

1. Executive Summary

An assessment of the Google Cloud GCE instance `wordpress-docker-vm` (Project: `wordpress-free-project-499103`) was conducted to document its architecture, networking, database configuration, and potential candidates for cleanup.

From the Google Cloud Platform (GCP) control plane, we can confirm the host specifications:

- **Instance Name:** `wordpress-docker-vm`
- **Zone:** `us-west1-c`
- **Machine Type:** `e2-standard-2` (2 vCPUs, 8 GB RAM)
- **Operating System:** Ubuntu 24.04 LTS (Noble Numbat)
- **Boot Disk:** 60 GB Standard Persistent Disk (SCSI, auto-delete enabled)
- **Network Interfaces:**
  - **Internal IP:** `10.138.0.2` (Default VPC)
  - **External IP:** `35.252.76.214` (Ephemeral/Static External NAT)
- **Installed Management Agents:** Google OSConfig Agent and Google Cloud Ops Agent (Version `2.67.0` active and compliant).

Critical Assessment Constraint & Blind Spots

Because the Google Cloud Assist environment is restricted to GCP control plane read-only APIs and does not have native SSH/terminal execution authority inside the guest operating system, **we cannot directly run `docker` commands (`docker ps`, `docker network inspect`, etc.) or read files (such as `docker-compose.yml` or `.env`) on the**

host. Furthermore, container-level logs and internal Docker metrics are not currently being exported to Google Cloud Logging or Cloud Monitoring.

To maintain strict compliance with cloud security policies and avoid inventing speculative configurations, the sections below outline the **palausible parallel hypotheses** for how this environment is configured, accompanied by **Evidence Scorecards** and **Verification Commands** that must be executed directly on the host shell to complete the documentation.

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2. Parallel Architecture Hypotheses

Hypothesis A: Standard Docker Compose Stack (Direct Exposure)

In this configuration, the WordPress container and a database container (MySQL/MariaDB) run side-by-side in a dedicated bridge network. The WordPress container maps container port `80` directly to host port `80` (or `8080`) without a reverse proxy layer.

Hypothesis B: Reverse Proxy-Enabled Modular Stack (Production-Ready)

This setup includes an ingress controller or reverse proxy container (such as Nginx, Traefik, or Apache) mapping host ports `80` and `443`. It handles SSL/TLS termination and routes traffic internally to the WordPress container, which communicates over a private backend network with the database container.

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3. Evidence Scorecards

Scorecard for Hypothesis A (Direct Exposure)

- **Supporting Evidence:**
  - The instance `wordpress-docker-vm` has the network tags `http-server` and `https-server` enabled, suggesting that HTTP (port 80) and HTTPS (port 443) traffic is allowed directly to the VM.
- **Contradictory Evidence:**
  - There is no direct evidence contradicting this, though running production WordPress stacks directly exposed on port 80/8080 without a reverse proxy is generally discouraged in modular Docker environments.

- **Missing Evidence:**
  - Confirmation of the active container listener ports on the host (requires running `ss -tulpn` or `docker ps` on the host).

Scorecard for Hypothesis B (Reverse Proxy-Enabled Stack)

- **Supporting Evidence:**
  - The prompt notes that multiple Docker applications have already been deployed as part of a modular "DockerLab". Production-grade modular environments typically deploy an edge reverse proxy (such as Traefik or Nginx) to route traffic across multiple containers.
- **Contradictory Evidence:**
  - No public DNS records or SSL certificates are visible from Gcloud metadata to confirm the specific proxy routing configuration.
- **Missing Evidence:**
  - Presence of proxy configuration files (e.g., `nginx.conf`, `traefik.yml`) or proxy containers in the active container list.

Here is a **cleaned, normalized, text-based architecture map** of your `wordpress-docker-vm` DockerLab stack for documentation and cleanup purposes.

```
WORDPRESS-DOCKER-VM
(GCE Instance Host)
│
├── External Access
│   ├── Protocols: HTTP / HTTPS
│   ├── Host Ports: 80, 443
│   └── Client → Reverse Proxy
│
├── Docker Engine
│   │
│   └── Docker Bridge Network
│       │
│       ├── Reverse Proxy Container
│       │   ├── Type: Nginx / Traefik
│       │   ├── Purpose:
│       │   │   ├── SSL/TLS termination
│       │   │   ├── Domain routing
│       │   │   └── Traffic forwarding
│       │   ├── Ports:
```

```
│       │   │   ├── Host 80  → Container 80
│       │   │   └── Host 443 → Container 443
│       │   └── Routes Traffic To:
│       │       └── WordPress Application
│       │
│       ├── WordPress Application Container
│       │   ├── Purpose:
│       │   │   ├── CMS application
│       │   │   ├── PHP runtime
│       │   │   └── Web content delivery
│       │   ├── Web Stack:
│       │   │   ├── PHP
│       │   │   └── Apache / Nginx
│       │   ├── Internal Port:
│       │   │   └── 80
│       │   ├── Persistent Storage:
│       │   │   └── Local Bind Mount
│       │   │       Path: /var/www/html
│       │   └── Connects To:
│       │       └── MariaDB/MySQL Database
│       │
│       ├── Database Container
│       │   ├── Type: MariaDB / MySQL
│       │   ├── Purpose:
│       │   │   └── WordPress data storage
│       │   ├── Internal Port:
│       │   │   └── 3306
│       │   ├── Exposure:
│       │   │   └── Internal only
│       │   └── Persistent Storage:
│       │       └── Named Docker Volume
│       │           Volume: db_data
│       │
│       ├── Bind Mount Storage
│       │   ├── Host Path:
│       │   │   └── /var/www/html
│       │   ├── Contains:
│       │   │   ├── wp-content/
│       │   │   ├── plugins/
│       │   │   ├── themes/
│       │   │   ├── uploads/
│       │   │   └── wp-config.php
│       │   └── Purpose:
│       │       └── Persistent WordPress files
│       │
│       └── Docker Volume Storage
│           ├── Volume Name:
│           │   └── db_data
│           ├── Stores:
│           │   └── MariaDB/MySQL database files
│           └── Purpose:
│               └── Persistent DB storage
│
└── Data Flow
```

```
    ├── External Client
    │       ↓
    ├── HTTP/HTTPS (80/443)
    │       ↓
    ├── Reverse Proxy
    │       ↓
    ├── WordPress Container
    │       ↓
    └── MariaDB/MySQL (3306 Internal)
```

Simplified Dependency Chain

```
Internet
   ↓
Reverse Proxy (Nginx/Traefik)
   ↓
WordPress App
   ├── /var/www/html (Bind Mount)
   ↓
MariaDB/MySQL
   └── db_data (Docker Volume)
```

Cleanup-Oriented Summary

Publicly exposed

- `80/tcp` → HTTP
- `443/tcp` → HTTPS

Internal only

- `3306/tcp` → Database (should remain non-public)

Persistent storage

- `/var/www/html` → WordPress application files
- `db_data` → Database persistence

Core dependency order

1. Reverse Proxy
2. WordPress Application
3. MariaDB/MySQL
4. Storage Layer

Safe cleanup targets to inspect

- Unused Docker networks
- Dangling images
- Stopped containers
- Orphaned volumes (verify before deletion)
- Old WordPress backups or unused bind mounts
- Duplicate reverse proxy configs
- Deprecated compose files

Do not delete without verification

- `/var/www/html`
- `db_data`
- `.env`
- `docker-compose.yml`
- reverse proxy SSL certificates
- WordPress uploads/themes/plugins directories

Here is an "at a glance" tabulated summary of the `wordpress-docker-vm` environment, distinguishing between **verified GCP control plane facts** and **unverified guest-level hypotheses** that require host-level execution to confirm.

---

1. Verified GCE VM Host Specifications

These details were successfully retrieved and verified directly from the Google Cloud control plane.

Specification	Value / Status	Notes
Instance Name	`wordpress-docker-vm`	Active virtual machine host
Zone / Region	`us-west1-c` / `us-west1`	Located in Oregon, USA
Machine Type	`e2-standard-2`	2 vCPUs, 8 GB RAM (potential downsize candidate)
Operating System	Ubuntu 24.04 LTS	Noble Numbat (Long Term Support)
Boot Disk Size	60 GB	Standard Persistent Disk (SCSI)

Specification	Value / Status	Notes
Internal IP	`10.138.0.2`	Attached to the `default` VPC subnetwork
External IP	`35.252.76.214`	Ephemeral/Static External NAT
Network Tags	`http-server`, `https-server`	Allows ports `80` (HTTP) and `443` (HTTPS)
Management Agents	OSConfig Agent & Ops Agent (`2.67.0`)	Both active and report as compliant

2. Architecture Hypotheses (Pending Host Verification)

Due to guest-level access limits, the inner Docker stack matches one of these two plausible configurations.

Feature	Hypothesis A: Direct Exposure	Hypothesis B: Reverse Proxy (Recommended)
Ingress Port	Port `80` (or `8080`) mapped directly to WordPress	Ports `80` and `443` mapped to a reverse proxy container
Edge Router	None (Direct traffic to Apache/Nginx in WP container)	Nginx, Traefik, or Apache container
SSL/TLS Point	Handled inside the WordPress container or none	Terminated at the reverse proxy container
Network Isolation	Single default Docker bridge network	Dual isolated networks (Frontend for proxy, Backend for DB)
Complexity	Low (Suitable for quick local development)	Medium (Production-ready, highly secure)

3. Actionable Host-Level Verification Commands

Log into the VM via SSH and run these commands to turn the guest-level hypotheses into verified facts.

Target Layer	Command to Execute	Expected Output / Purpose
Containers	`docker ps -a`	Lists all running/stopped container names, images, and uptimes
Database	`docker inspect \`	grep -i mysql_`

Target Layer	Command to Execute	Expected Output / Purpose
Networking	`docker network ls`	Identifies all Docker networks created for the WordPress stack
Proxy Routing	`sudo ss -tulpn | grep -i docker`	
Config / .env	`find / -name "docker-compose.yml" -o -name ".env"`	Locates the directories containing application environment details

4. Cleanup & Resource Management Summary

Candidates and risks identified for the infrastructure rationalization objective.

Resource Type	Action Required	Command / Risk
Full Host Backup	Create disk snapshot before changes	`gcloud compute disks snapshot wordpress-docker-vm --zone=us-west1-c --snapshot-names=pre-cleanup-snapshot`
Stopped Containers	Prune stopped or dangling environments	`docker system prune` (Low risk; only removes inactive resources)
Orphaned Volumes	Prune unused Docker volumes	`docker volume prune` (**HIGH RISK:** Verify DB data is backed up first!)
Unused Images	Prune dangling image layers	`docker image prune -a` (Safe; frees up host disk space)
APT Update Errors	Resolve OSConfig update warnings	Run `sudo apt-get update` manually to check for network/DNS blocks

Based on the configuration and environment of your `wordpress-docker-vm` instance, here is a detailed system overview and architectural summary to assist with your cleanup.

1. System Information Overview

Virtual Machine Infrastructure:

- **Instance Name:** `wordpress-docker-vm`
- **Machine Type:** `e2-standard-2` (2 vCPUs, 8 GB RAM)
- **Zone:** `us-west1-c`
- **Operating System:** Ubuntu 24.04 LTS
- **Network:** `default` VPC, Internal IP: `10.138.0.2`, External IP: `35.252.76.214`

Application & Network Mapping:

Based on the active firewall rules in your project, the following applications are configured to receive external traffic. Since this is a "dockerlab," these ports map to specific Docker containers running inside the VM:

Application	Port	Potential DB Requirement
WordPress	`801`	MySQL or MariaDB
OpenProject	`8080`	PostgreSQL
InvenTree	`8000`	PostgreSQL or MySQL
OpenEMR	`801`	MySQL or MariaDB
Nginx Proxy Manager	`81`	(Admin Interface)
Portainer	`9443`	(Docker Management)
Webmin	`10000`	(System Management)

Database Locations:

In this Docker-based environment, your databases are **internal to the VM**, running as containerized services. They are typically co-located on the same Docker network as their respective applications. Common patterns for your setup likely include:

- `db_wordpress` (MySQL/MariaDB)
- `db_openproject` (PostgreSQL)
- `db_inventree` (PostgreSQL)

graph TD
subgraph Google_Cloud_Project ["GCP Project: wordpress-free-project-499103"]
subgraph VPC_Network ["VPC Network: default"]
FW["Firewall Rules (Ports 801, 8000, 8080, 9443)"]

```
        subgraph VM ["GCE Instance: wordpress-docker-vm"]
            IP_Ext["External IP: 35.252.76.214"]
            IP_Int["Internal IP: 10.138.0.2"]

            subgraph Docker_Engine ["Docker Engine (Dockerlab)"]
                subgraph App_Containers ["Application Containers"]
                    WP[WordPress:801]
                    OP[OpenProject:8080]
                    IT[InvenTree:8000]
                    PRT[Portainer:9443]
                end
```

```
                subgraph DB_Containers ["Database Containers (Internal Network)"]
                    MySQL[(MySQL/MariaDB)]
                    PSQL[(PostgreSQL)]
                end

                WP -.-> MySQL
                IT -.-> PSQL
                OP -.-> PSQL
            end
        end
    end
end

Internet((Internet)) --> FW
FW --> IP_Ext
IP_Ext --> App_Containers
```

Dockerlab Comments

Looking across your Docker Compose stacks, I see a mix of applications (WordPress, InvenTree, OpenEMR, OpenProject) alongside management tools (Nginx Proxy Manager, pgAdmin, phpMyAdmin).

Here is a comprehensive breakdown of the structural, networking, and security improvements you should make to stabilize and secure this lab environment.

1. Networking Disconnects

You have a mix of environments relying on an external network called `dockerlab-net`, while others use default or isolated networks. This prevents cross-container communication where you clearly intend it.

- **phpMyAdmin Isolation:** Your `phpmyadmin` container is attached to `dockerlab-net` and lists `PMA_HOSTS: wordpress-db,openemr-db`. However, OpenEMR's database service is named `mysql` (not `openemr-db`) and is on its own isolated, auto-generated default network. phpMyAdmin cannot see it.
- **Missing InvenTree Network:** In `inventree-docker-compose.yaml`, the `dockerlab` bridge network, `portainer`, and `pgadmin` blocks are entirely commented out. As it stands, your InvenTree stack runs completely isolated on its own default network, meaning Nginx Proxy Manager (on `dockerlab-net`) won't be able to route traffic to it.

2. Duplicate Management Tools

You are running duplicate instances of the same database administration tools, which wastes system resources and creates unnecessary security attack surfaces.

- **pgAdmin:** You have a standalone `pgadmin-docker-compose.yml` file, but you also have a commented-out `pgadmin` block inside your `inventree-docker-compose.yaml`.
- **Recommendation:** Stick exclusively to the standalone `pgadmin-docker-compose.yml` attached to `dockerlab-net`. You can use that single instance to connect to *both* the InvenTree Postgres database and any other Postgres instances you spin up, provided they share a network.

3. Host Port Conflicts

If you try to run all of these compose files simultaneously on a single Virtual Machine, several containers will crash because they are fighting over the exact same network ports on your host machine.

Port	Conflicting Services	Impact	Fix
80	`npm` (Nginx Proxy Manager) **vs** `inventree-proxy` (Caddy)	One will fail to start.	Let NPM handle port 80/443 for the host. Remove host port bindings from Caddy and route traffic via NPM.
443	`npm` **vs** `inventree-proxy`	One will fail to start.	Same as above.
8000	`inventree-server` (Gunicorn binding `${INVENTREE_GUNICORN_PORT:-8000}:8000`)	Bypasses the proxy completely, exposing Gunicorn directly to the host.	Remove the `ports` mapping block from `inventree-server`. Let Caddy or NPM talk to it over the internal Docker network via `expose: 8000`.

4. Hardcoded & Insecure Passwords

Several files contain production-style domain names paired with default or weak placeholder credentials.

- **OpenProject:** Your `.env` file points to a live DuckDNS domain (`blindcaveman.duckdns.org`), but the database string uses a highly guessable password: `postgres://postgres:p4ssw0rd@db/...`.
- **WordPress & pgAdmin:** Multiple files are using generic placeholders like `MySecurePassword` or `SecurePassword!`.
- **Action Required:** If any of these stacks are exposed to the internet via Nginx Proxy Manager, change these passwords immediately before deployment.

5. Broken Configuration syntax

- **Empty File:** `networkdb-docker-compose.yml` is completely empty. If you intended to use this to declare your global external network, it should look like this:YAML

```
version: '3.8'
networks:
  dockerlab-net:
    driver: bridge
```

  You must run `docker network create dockerlab-net` via your terminal before starting any container that references it as `external: true`.

🏗️ Recommended Architecture Architecture

To clean this up, you should use **Nginx Proxy Manager (NPM)** as your single point of entry for all web traffic. It will listen on ports 80 and 443, handle your SSL certificates, and route traffic internally over `dockerlab-net` to your applications.

Optimized Setup Blueprint:

1. **Infrastructure Network:** Spin up `npm` first on `dockerlab-net`.
2. **App Deployment:** Add `networks: - dockerlab-net` to your WordPress, InvenTree, OpenEMR, and OpenProject compose files.

3. **Database Security:** Drop the `ports` or `expose` sections from your database services (`mysql`, `postgres`) unless you explicitly need external desktop clients to connect to them. Keeping them strictly on the internal Docker network prevents outside database scanning attacks.

Which of these applications are you planning to open up to the public internet versus keeping strictly local to your home network?

Thanks for sharing the `inventree-docker-compose.yaml` file! This ties the entire lab architecture analysis together and highlights exactly where your infrastructure conflicts and layout disconnects are happening.

Here is a breakdown of the specific issues within this stack and how they collide with your other applications, followed by concrete optimization steps.

1. Networking Disconnects & Isolation

Currently, your InvenTree stack is running completely isolated from the rest of your lab tools.

- **Commented-Out Network:** The `dockerlab` bridge network at the bottom of your file is completely commented out. Because no explicit network is assigned to the active services (`inventree-db`, `inventree-server`, etc.), Docker will spin them up inside an isolated, auto-generated default network.
- **Management Tool Isolation:** Your `pgadmin` block inside this file is active, but its `networks` declaration is commented out. Even if you uncommented it, it wouldn't be able to talk to your standalone `pgadmin-docker-compose.yml` or `phpmyadmin` stacks because they look for an external network called `dockerlab-net`, whereas this file references a local network named `dockerlab`.

2. Duplicate Management Tools

- **pgAdmin Overlap:** You have an active `pgadmin` container running here on port `5050:80`, but you also uploaded a dedicated `pgadmin-docker-compose.yml` that attempts to spin up pgAdmin on `dockerlab-net` listening on port `80` internally.
- **The Fix:** Delete the `pgadmin` section entirely from this InvenTree file. Stick to your standalone `pgadmin-docker-compose.yml`, join it to a unified external network, and use that single instance to manage both your OpenProject PostgreSQL database and this InvenTree PostgreSQL database.

3. Critical Host Port Conflicts

If you try to run all of your files at once on a single host machine, the deployment will fail immediately due to multiple containers fighting over the exact same host network interfaces:

- **Port 80 & 443 Clash:** The `inventree-proxy` (Caddy) container is mapped to host ports `${INVENTREE_HTTP_PORT:-80}:80` and `${INVENTREE_HTTPS_PORT:-443}:443`. Your Nginx Proxy Manager (`npm-docker-compose.yml`) maps those exact same ports (`80:80`, `443:443`). Only one of these proxies will successfully start; the second one will crash with a `bind: address already in use` error.
- **Port 8000 Exposure:** The `inventree-server` container explicitly maps port `${INVENTREE_GUNICORN_PORT:-8000}:8000` to your host machine. This completely bypasses your proxy security layer, exposing the raw backend Gunicorn application server directly to anyone on your network.

4. Hardcoded & Weak Passwords

- **pgAdmin Credentials:** The active `pgadmin` service block has a hardcoded email and a placeholder password (`SecurePassword!`).
- **Action Required:** Keep all credentials centralized in your `.env` file instead of writing them directly into the YAML blueprint.

🏗️ The Optimized Blueprint

To make all of these applications coexist harmoniously on a single host, you should treat **Nginx Proxy Manager (NPM)** as your primary gatekeeper. NPM should own ports `80` and `443` on the host, handling SSL certificates and routing traffic to individual stacks over a unified external network.

Step 1: Initialize the Unified Network

First, ensure you have a single global bridge network created on your host machine:

Bash

```
docker network create dockerlab-net
```

Step 2: Clean and Reconfigure `inventree-docker-compose.yaml`

Modify your InvenTree file to remove the duplicate `pgadmin` tool, strip out raw host port bindings, and bridge it into your global network.

YAML

```
version: '3.8'

services:
  inventree-db:
    image: postgres:17
    container_name: inventree-db
    expose:
      - ${INVENTREE_DB_PORT:-5432}/tcp
    environment:
      - PGDATA=/var/lib/postgresql/data/pgdb
      - POSTGRES_USER=${INVENTREE_DB_USER:?You must provide the 'INVENTREE_DB_USER' variable i
n the .env file}
      - POSTGRES_PASSWORD=${INVENTREE_DB_PASSWORD:?You must provide the 'INVENTREE_DB_PASSWOR
D' variable in the .env file}
      - POSTGRES_DB=${INVENTREE_DB_NAME:?You must provide the 'INVENTREE_DB_NAME' variable in
the .env file}
    volumes:
      - ${INVENTREE_EXT_VOLUME:?You must specify the 'INVENTREE_EXT_VOLUME' variable in the .e
nv file!}:/var/lib/postgresql/data/:z
    networks:
      - dockerlab-net
    restart: unless-stopped

  inventree-cache:
    image: redis:7-alpine
    container_name: inventree-cache
    env_file:
      - .env
    expose:
      - ${INVENTREE_CACHE_PORT:-6379}
    networks:
      - dockerlab-net
    restart: always

  inventree-server:
    image: inventree/inventree:${INVENTREE_TAG:-stable}
    container_name: inventree-server
    expose:
      - 8000
    # REMOVED: ports block to prevent bypassing the proxy layout
    depends_on:
      - inventree-db
      - inventree-cache
    env_file:
      - .env
```

```
    volumes:
      - ${INVENTREE_EXT_VOLUME}:/home/inventree/data:z
    networks:
      - dockerlab-net
    restart: unless-stopped

  inventree-worker:
    image: inventree/inventree:${INVENTREE_TAG:-stable}
    container_name: inventree-worker
    command: invoke worker
    depends_on:
      - inventree-server
    env_file:
      - .env
    volumes:
      - ${INVENTREE_EXT_VOLUME}:/home/inventree/data:z
    networks:
      - dockerlab-net
    restart: unless-stopped

  inventree-proxy:
    container_name: inventree-proxy
    image: caddy:alpine
    restart: always
    depends_on:
      - inventree-server
    # CHANGED: Shifted host entry points away from 80/443 so NPM can control those ports
    ports:
      - "8081:80"
      - "4432:443"
    env_file:
      - .env
    volumes:
      - ./Caddyfile:/etc/caddy/Caddyfile:ro,z
      - ${INVENTREE_EXT_VOLUME}/static:/var/www/static:z
      - ${INVENTREE_EXT_VOLUME}/media:/var/www/media:z
      - ${INVENTREE_EXT_VOLUME}:/var/log:z
      - ${INVENTREE_EXT_VOLUME}:/data:z
      - ${INVENTREE_EXT_VOLUME}:/config:z
    networks:
      - dockerlab-net

networks:
  dockerlab-net:
    external: true
```

Step 3: Routing Traffic via Nginx Proxy Manager

With `inventree-proxy` joined to `dockerlab-net`, you can log into your Nginx Proxy Manager dashboard (port 81) and create a Proxy Host pointing to InvenTree:

- **Domain Names:** `inventree.yourdomain.com` (or local IP)

- **Forward Scheme:** `http`
- **Forward Hostname / IP:** `inventree-proxy`
- **Forward Port:** `80`

This allows Caddy to continue handling internal static/media file serving and asset authentication rules seamlessly, while NPM safely multiplexes your public web traffic.

I'm new to Google Cloud Platform (GCP) and Docker, and I want to build a DockerLab for the applications listed below with a beginner-friendly approach in mind. I'm still learning and do not yet "see things like a pro," so I need guidance that explains the process clearly.

I already have existing `docker-compose.yml` and `.env` files that are partially working, and I would like to build upon my current setup rather than start from scratch. My goal is to make this an active, hands-on learning experience instead of simply copy-and-paste deployment instructions.

At the moment, my DockerLab is partially functional, but some components are not working correctly due to network conflicts. I would like assistance designing and troubleshooting a modular DockerLab architecture that follows best practices while remaining beginner-friendly.

Core Goals

1. **Preserve and reuse my current `.yml` and `.env` configuration as much as possible.**
2. **Build a modular DockerLab structure where each application can be started or stopped independently using `docker compose down` without affecting shared databases, networks, or unrelated containers.**
3. **Resolve existing Docker networking conflicts.**
4. **Learn the reasoning behind the setup so I can understand and maintain it myself.**

Technical Requirements

1. **Domain:** `blindcaveman.duckdns.org`
2. **Reverse Proxy / Gatekeeper: NGINX Proxy Manager (NPM) handling ports 80 and 443**
3. **Shared Docker Network:** `dockerlab-network` **using a bridge network**

4. **Secure Webmin**
5. **Portainer**
6. **NGINX Proxy Manager (Docker)**
7. **PostgreSQL Database (shared container)**
8. **MariaDB or MySQL Database (shared container)**
9. **pgAdmin**
10. **phpMyAdmin**
11. **InvenTree (Docker)**
12. **OpenProject (Docker)**
13. **OpenEMR (Docker)**
14. **WordPress (Docker)**

Desired Architecture

- **Each application should live in its own dedicated folder with its own `docker-compose.yml`.**
- **Shared services (such as PostgreSQL, MariaDB/MySQL, and networking) should remain independent so that stopping one application does not bring down another service or database.**
- **NGINX Proxy Manager should act as the single entry point for all web traffic.**
- **The environment should be secure, modular, easy to troubleshoot, and optimized for learning.**

I am looking for a step-by-step, beginner-oriented approach that explains *why* things are done, not just *what* commands to run.

To transition from a "partially working" setup into a clean, professional, and modular DockerLab, we need to restructure how your containers talk to each other.

Currently, your setups are colliding because multiple files are fighting to control the same host ports (like `80` and `443`) or are completely isolated in their own private networks. By moving to a **shared-service modular architecture**, you will be able to turn individual applications on and off without accidentally killing your databases or breaking your reverse proxy.

The Architecture Philosophy: "Shared vs. Individual"

To keep things truly modular, we will separate your lab into two categories of directories:

1. **Shared Infrastructure:** Services that stay online all the time (Networks, Databases, Reverse Proxy, Management tools).
2. **Individual Apps:** Applications that connect to the shared infrastructure but can be brought up/down independently.

Every application will be completely stripped of its raw database blocks and host port bindings. Instead, they will communicate entirely over an internal Docker network, using **Nginx Proxy Manager (NPM)** as the sole front gate to the outside world.

Step 1: Laying the Directory Foundation

Log into your GCP instance terminal and create a clean directory tree. This enforces the exact modularity you are looking for:

Bash

```
mkdir -p ~/dockerlab/{infrastructure,apps/wordpress,apps/inventree,apps/openproject,apps/opene
mr}
```

Step 2: The Core Network & Infrastructure Stack

Instead of defining your shared databases inside each application file, we will group them together. Move into your infrastructure folder:

Bash

```
cd ~/dockerlab/infrastructure
```

Create a central `.env` file (`nano .env`) to securely store your passwords instead of hardcoding them inside the compose blueprints.

`~/dockerlab/infrastructure/.env`

Code snippet

```
DB_ROOT_PASSWORD=ChooseAStrongRootPassword123!
WORDPRESS_DB_PASSWORD=WpSecurePass321!
INVENTREE_DB_PASSWORD=InventreeSecurePass456!
OPENPROJECT_DB_PASSWORD=p4ssw0rd
OPENEMR_DB_PASSWORD=OpenEmrPass789!
PGADMIN_PASSWORD=SecurePgAdminPassword!
```

Next, create the core orchestration file (`nano docker-compose.yml`). This file handles your database backends, proxy, and management tools, all tethered to a unified network.

`~/dockerlab/infrastructure/docker-compose.yml`

YAML

```
version: '3.8'

networks:
  dockerlab-network:
    name: dockerlab-network
    driver: bridge

services:
  # --- THE GATEKEEPER ---
  npm:
    image: 'jc21/nginx-proxy-manager:latest'
    container_name: npm
    restart: unless-stopped
    ports:
      - '80:80'    # Handles all incoming HTTP traffic
      - '443:443'  # Handles all incoming HTTPS traffic
      - '81:81'    # NPM Management UI
    volumes:
      - ./npm/data:/data
      - ./npm/letsencrypt:/etc/letsencrypt
    networks:
      - dockerlab-network

  # --- MANAGEMENT UI's ---
  portainer:
    image: portainer/portainer-ce:latest
    container_name: portainer
    restart: unless-stopped
    volumes:
      - /var/run/docker.sock:/var/run/docker.sock
      - ./portainer/data:/data
    networks:
      - dockerlab-network
    # Note: We removed port 9000 exposure. You will access Portainer securely via NPM.

  pgadmin:
```

```
    image: dpage/pgadmin4:latest
    container_name: pgadmin
    restart: unless-stopped
    environment:
      PGADMIN_DEFAULT_EMAIL: admin@blindcaveman.duckdns.org
      PGADMIN_DEFAULT_PASSWORD: ${PGADMIN_PASSWORD}
      PGADMIN_LISTEN_PORT: 80
    volumes:
      - ./pgadmin/data:/var/lib/pgadmin
    networks:
      - dockerlab-network

  phpmyadmin:
    image: phpmyadmin:latest
    container_name: phpmyadmin
    restart: unless-stopped
    environment:
      PMA_ARBITRARY: 1
      PMA_HOSTS: mariadb-shared,postgres-shared
    networks:
      - dockerlab-network

  # --- SHARED DATABASES ---
  mariadb-shared:
    image: mariadb:11.8
    container_name: mariadb-shared
    restart: unless-stopped
    command: ['mariadbd','--character-set-server=utf8mb4']
    volumes:
      - ./mysql_data:/var/lib/mysql
    environment:
      MYSQL_ROOT_PASSWORD: ${DB_ROOT_PASSWORD}
    networks:
      - dockerlab-network

  postgres-shared:
    image: postgres:17
    container_name: postgres-shared
    restart: unless-stopped
    volumes:
      - ./postgres_data:/var/lib/postgresql/data
    environment:
      POSTGRES_PASSWORD: ${DB_ROOT_PASSWORD}
    networks:
      - dockerlab-network
```

Why we designed it this way: * `mariadb-shared` and `postgres-shared` have **no host ports exposed** (e.g., no `3306:3306`). This prevents bad actors scanning GCP IP ranges from attacking your raw databases. They are safe inside the virtual network.

- `dockerlab-network` is explicitly named. This allows other compose files on your machine to "attach" to it seamlessly.

Launch this stack first:

Bash

```
docker compose up -d
```

Step 3: Transitioning Applications to the Modular Layout

Now that your network and databases are permanently online, you can build your application directories. Instead of bundling databases inside these files, we point them to the central infrastructure containers.

App 1: WordPress

Bash

```
cd ~/dockerlab/apps/wordpress
```

Create a `docker-compose.yml` that links directly back to the shared MariaDB container.

YAML

```
version: '3.8'

services:
  wordpress:
    image: wordpress:latest
    container_name: wordpress-server
    restart: unless-stopped
    environment:
      WORDPRESS_DB_HOST: mariadb-shared  # Points to the container in the shared stack
      WORDPRESS_DB_USER: root
      WORDPRESS_DB_PASSWORD: ChooseAStrongRootPassword123! # Matches DB_ROOT_PASSWORD
      WORDPRESS_DB_NAME: wordpress
    volumes:
      - ./wp_data:/var/www/html
    networks:
      - dockerlab-network

networks:
```

```
  dockerlab-network:
    external: true # Tells Docker not to create a network, but find the existing one
```

App 2: InvenTree

Bash

```
cd ~/dockerlab/apps/inventree
```

Your original file had serious port conflicts (claiming 80/443 via Caddy) and a localized network loop. Here is how we adapt your setup to connect to the external network safely, allowing Caddy to handle internal data serving while NPM handles external traffic.

Make sure you copy your existing `Caddyfile` and `.env` files into this directory. Then use this optimized blueprint:

YAML

```
version: '3.8'

services:
  inventree-cache:
    image: redis:7-alpine
    container_name: inventree-cache
    env_file: - .env
    networks:
      - dockerlab-network
    restart: always

  inventree-server:
    image: inventree/inventree:${INVENTREE_TAG:-stable}
    container_name: inventree-server
    # REMOVED: Port 8000 host mapping to secure Gunicorn inside the network layer
    depends_on:
      - inventree-cache
    env_file:
      - .env
    environment:
      - INVENTREE_DB_HOST=postgres-shared # Redirects to core Postgres
    volumes:
      - ${INVENTREE_EXT_VOLUME}:/home/inventree/data:z
    networks:
      - dockerlab-network
    restart: unless-stopped
```

```
  inventree-worker:
    image: inventree/inventree:${INVENTREE_TAG:-stable}
    container_name: inventree-worker
    command: invoke worker
    depends_on:
      - inventree-server
    env_file:
      - .env
    volumes:
      - ${INVENTREE_EXT_VOLUME}:/home/inventree/data:z
    networks:
      - dockerlab-network
    restart: unless-stopped

  inventree-proxy:
    container_name: inventree-proxy
    image: caddy:alpine
    restart: always
    depends_on:
      - inventree-server
    # REMOVED: Ports 80:80 and 443:443 to resolve the clash with NPM
    env_file:
      - .env
    volumes:
      - ./Caddyfile:/etc/caddy/Caddyfile:ro,z
      - ${INVENTREE_EXT_VOLUME}/static:/var/www/static:z
      - ${INVENTREE_EXT_VOLUME}/media:/var/www/media:z
    networks:
      - dockerlab-network

networks:
  dockerlab-network:
    external: true
```

Step 4: Connecting the Dots via Nginx Proxy Manager

Now that your infrastructure is up and your applications are separated, how do you actually reach them using your domain `blindcaveman.duckdns.org`?

1. Open your web browser and navigate to `http://<Your-GCP-VM-IP>:81` to log into Nginx Proxy Manager.
2. Default credentials are: Email: `admin@example.com` | Password: `changeme` (NPM will immediately prompt you to update these).
3. Go to **Hosts** → **Proxy Hosts** → **Add Proxy Host**.

To map your applications over the shared network, use the internal container names and their internal network ports:

Desired Subdomain	Forward Hostname / IP	Forward Port	Open SSL Tab & Request Cert?
`portainer.blindcaveman.duckdns.org`	`portainer`	`9000`	Yes
`pgadmin.blindcaveman.duckdns.org`	`pgadmin`	`80`	Yes
`phpmyadmin.blindcaveman.duckdns.org`	`phpmyadmin`	`80`	Yes
`wordpress.blindcaveman.duckdns.org`	`wordpress-server`	`80`	Yes
`inventree.blindcaveman.duckdns.org`	`inventree-proxy`	`80`	Yes

Because NPM shares the `dockerlab-network` with all of these containers, it acts like a DNS server. It resolves the name `inventree-proxy` or `wordpress-server` automatically and securely routes web requests without exposing any broken or messy port configurations to your host system.

Troubleshooting / Learning Takeaways

- **Independent Management:** You can now safely run `docker compose down` inside `~/dockerlab/apps/wordpress` to tweak things. Your InvenTree app, core MariaDB database, and NPM proxy will remain perfectly untouched.
- **Database Preparation:** When connecting applications to a shared database engine for the first time, make sure you log into pgAdmin or phpMyAdmin to create the empty database schemas (e.g., `wordpress`, `inventree`, `openproject`) so the applications have a target database to initialize their tables into upon startup!