

# Docker Container Hardening Guide

## 1. Use Minimal Base Images

Use lightweight, secure base images like alpine or distroless. Avoid unnecessary tools/utilities inside the image.

## 2. Run as Non-Root

Never run containers as root. Create and use a non-root user in Dockerfile.

## 3. Limit Container Capabilities

Drop all Linux capabilities and add only what's needed using `--cap-drop` and `--cap-add` flags.

## 4. Use Read-Only Filesystems

Prevent writing to container filesystem using `--read-only`.

## 5. Use Seccomp, AppArmor, SELinux

Apply security profiles like seccomp, AppArmor, or SELinux for runtime protection.

## 6. Use Multi-Stage Builds

Separate build and runtime stages to exclude unnecessary files and reduce image size.

## 7. Scan for Vulnerabilities

Use tools like Trivy, Docker Scout, or Gype to scan images regularly.

## 8. Keep Images Up to Date

Regularly rebuild images to include the latest patches and avoid using `:latest` in production.

## 9. Limit Network Exposure

Use isolated Docker networks and avoid using host networking mode.

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## 10. Avoid Storing Secrets in Images

Never hardcode credentials in Dockerfile. Use a secrets manager.

## 11. Set Resource Limits

Set memory and CPU limits to prevent resource exhaustion attacks.

## 12. Audit Docker Daemon and Hosts

Harden the host OS, secure the Docker socket, and disable remote API without TLS.

## Recommended Tools

- Trivy: Vulnerability scanner for Docker images.
- Docker Scout: Official Docker image scanner.
- Gype: CLI vulnerability scanner.
- Dockle: Linter for Dockerfile security best practices.
- Clair: Static vulnerability analysis.
- Sysdig Falco: Real-time security monitoring and threat detection.