

Self-Healing Infrastructure with Prometheus, Alertmanager & Ansible

Project Objective

Automatically detect and recover from service failures using monitoring, alerting, and automation.

Stack

- Prometheus: Service monitoring
- Alertmanager: Alert routing
- Docker: Container orchestration
- Ansible: Automation & recovery
- Shell Script: Webhook action
- NGINX: Sample application

Folder Structure

```
self-healing-infra/  
├── ansible/           # Ansible automation  
├── prometheus/       # Prometheus config & rules  
├── alertmanager/     # Alertmanager config  
├── webhook/          # Webhook + Flask server  
├── docker-compose.yml # Docker stack  
└── README.md         # Documentation
```

How It Works

1. NGINX is monitored by Prometheus via Node Exporter.

2. If NGINX is detected down, Prometheus fires an alert.
3. Alertmanager routes the alert to a webhook.
4. The webhook runs an Ansible playbook to auto-restart NGINX.
5. Logs are stored for audit and visibility.

Setup Instructions

Start infrastructure:

```
docker-compose up -d
```

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Simulate failure:

```
docker stop $(docker ps -q --filter ancestor=nginx)
```

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- Observe auto-healing:
 - Prometheus detects downtime.
 - Alertmanager triggers webhook.
 - Webhook calls Ansible to restart NGINX.

View logs:

```
cat /tmp/webhook.log  
cat /tmp/ansible.log
```

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Additional Internal Details

- Prometheus scrapes Node Exporter metrics every 5 seconds.
- Alertmanager retries alert delivery if webhook initially fails.

- Webhook server is built with Python Flask and listens on port 5001.
- Ansible playbook uses the 'docker_container' module to ensure NGINX is up.
- Docker Compose sets up isolated networks for Prometheus and Node Exporter.
- Ansible logs are timestamped for auditing.
- Webhook server records incoming alert JSON payloads.
- Prometheus alert rules trigger after 15 seconds of continuous NGINX downtime.
- Alertmanager configuration includes a fallback receiver if webhook fails.
- Full recovery is expected within 30 to 40 seconds of downtime.

Deliverables

- Prometheus configuration files
- Prometheus alert rules
- Alertmanager webhook setup
- Webhook Python server script
- Ansible playbook for recovery
- Docker Compose stack
- Demo logs showing auto-healing