

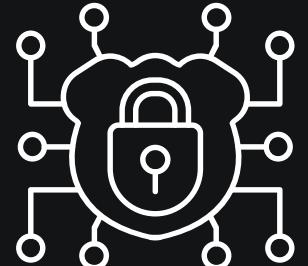
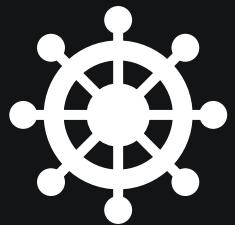
Integratieproject J3

Team 4
19 januari 2026

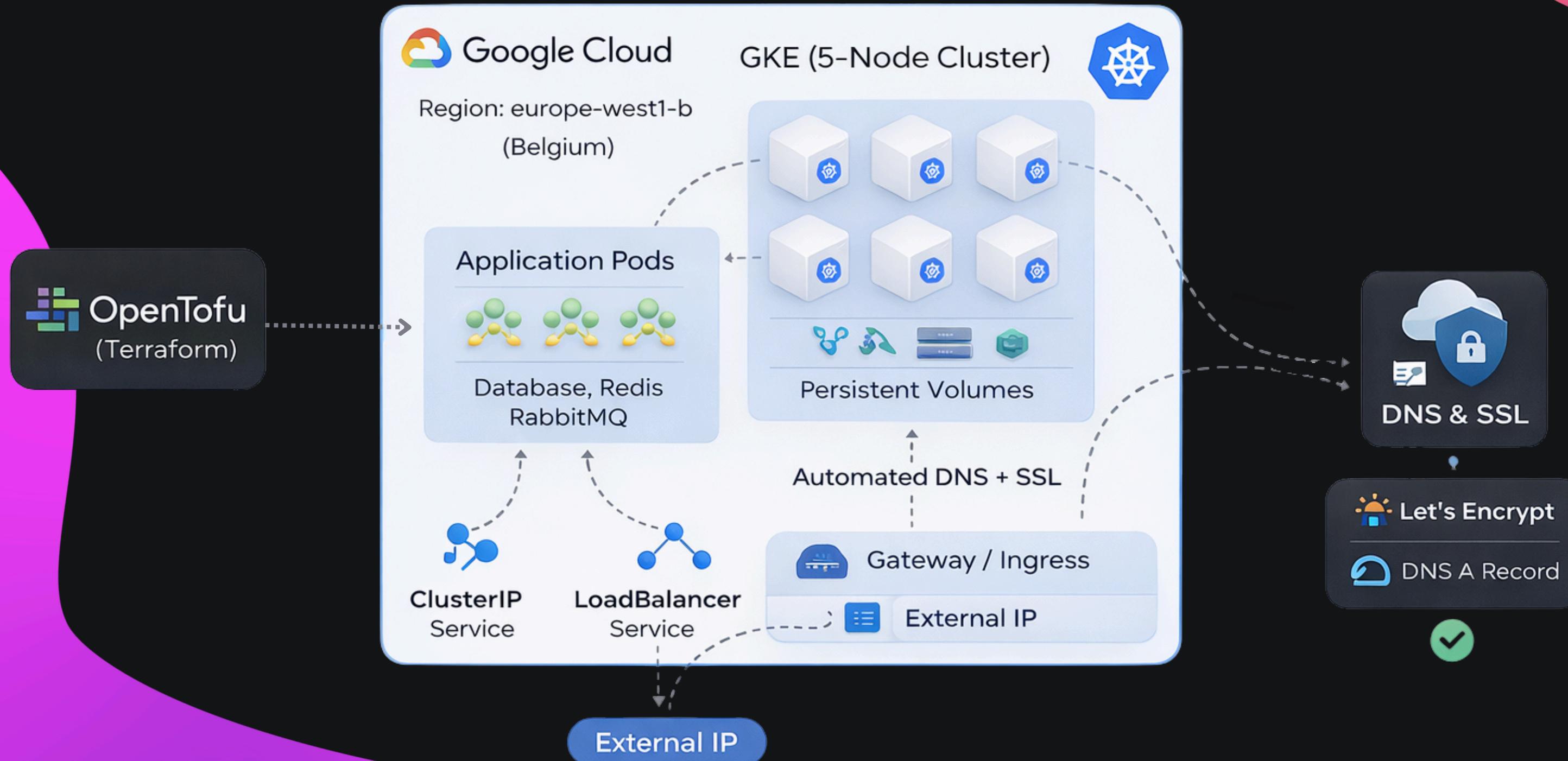
Mateen Murtaza
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Deployment Componenten

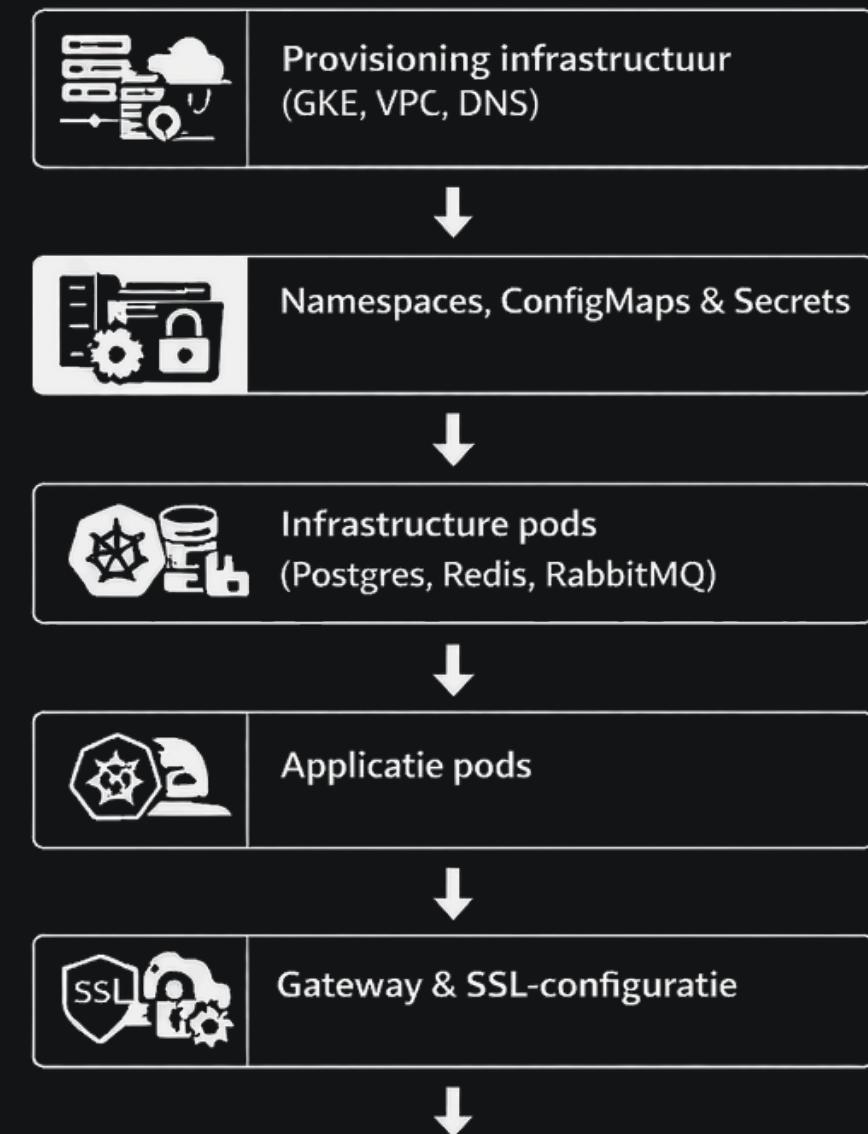
- Kubernetes deployments
- Services → LoadBalancer & ClusterIP
- PersistentVolumeClaims
- ConfigMaps & Secrets
- SSL-certificaten



Infrastructure Overview



Deployment Proces



De volgorde is cruciaal om race-conditions
en failures te vermijden.

Automatisatie Scripts

Kern van de automatisatie

- main.sh
 - → hoofd-orchestrator
- create-gcp-service-account.sh
 - serviceaccount instellen
- enable-gcp-apis.sh
 - → API's enablen
- setup-gitlab-registry.sh
 - → image pull secrets
- configure-keycloak.sh
 - → automatische IdP setup
- setup-cloud-dns.sh
 - → DNS records
- update-external-ip.sh
 - → ConfigMap updates

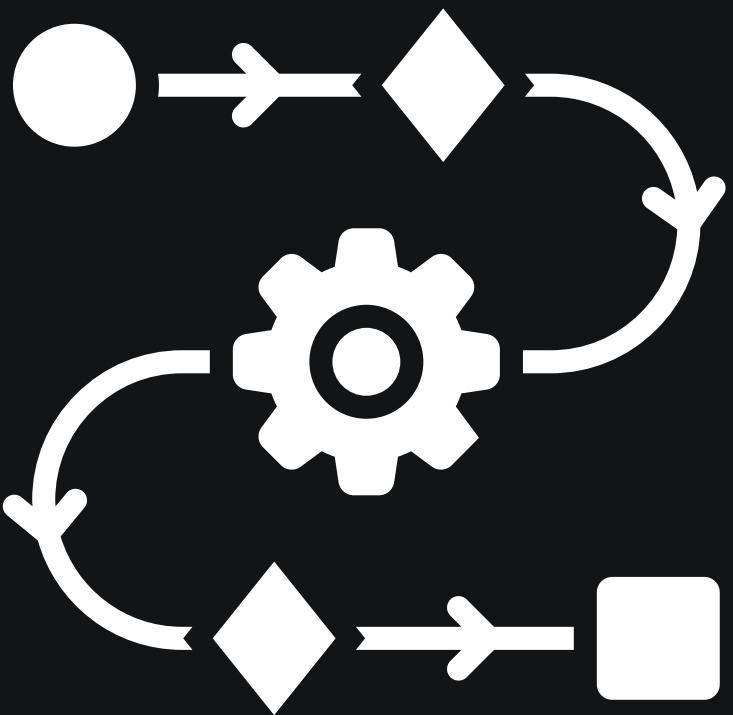
"Eén commando start het volledige proces."

Zero-Touch Deployment

Wat gebeurt volledig automatisch?

- Aanmaak GKE cluster
- Buckets
- DNS zone + A-records
- SSL-certificaten
- Keycloak realm & clients
- Database schema's
- Health monitoring

"Geen manuele stappen, geen copy-paste, geen menselijke fouten."



AI Deployment

Wat draait nu in productie:

- RAG Chatbot met LLM
 - AI-services live in productie
 - Werkende AI-functionaliteit in de cloud
 - AI-oplossingen actief in productie
 - Live endpoint: /api/chat
- AI Player Service
 - Tic-Tac-Toe AI
 - Generieke AI-game API
 - Live endpoint: /api/ai-player/games/

Gedeelde AI-infrastructuur

- Gebruik → meerdere Teams
- Herbruikbaar
- Consistente API's voor uniforme integratie



Live Demo

Productie-Features

Autoscaling

- dynamische nodes
- CPU/memory triggers
- pod scaling
- kost optimizatie

Self-healing

- auto pod restart
- crash recovery
- 99,9% uptime

Rolling Updates

- zero downtime
- graduelle rollout
- instant rollback
- version control

Load Balancing

- NGINX gateway
- traffic distribution
- session affinity
- health checks

Deployment Uitdagingen

Problemen & Oplossingen

- Resource quota's
 - → single-zone strategie
- Pod startup volgorde
 - → sequentiële manifests
- Externe IP timing
 - → ConfigMap patching
- Developers
 - → laattijdige actie

"Elk probleem is structureel opgelost, niet handmatig gefixt."

Gitlab

The image shows a screenshot of a GitLab interface with three main sections:

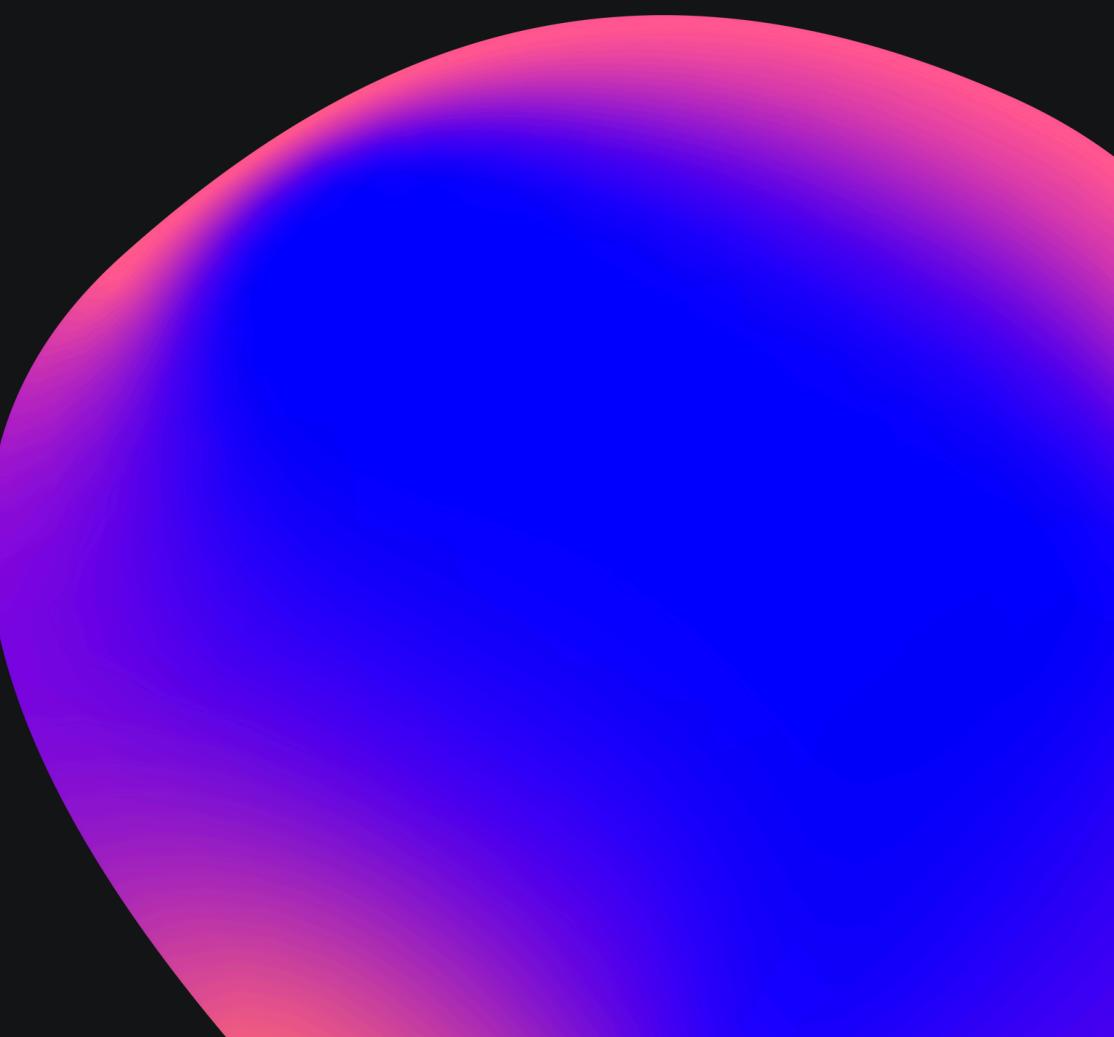
- Left Panel (Modal):** A "Create issue" dialog box with a "Title" input field and two buttons: "Create issue" and "Cancel".
- Middle Panel (status doing):** A board view showing tasks in progress. One task is visible: "Team 4 deploy" (Issue #13, Milestone 4).
- Right Panel (status done):** A board view showing completed tasks. The list includes:
 - "laatste updates team4" (Issue #20)
 - "Team 4 deploy" (Issue #13, Milestone 4)
 - "presentatie maken" (Issue #21)
 - "buckets fixen voor team8" (Issue #16)
 - "Team 12 deploy" (Issue #15, Milestone 4)
 - "Team 8 deploy" (Issue #14, Milestone 4)
 - "Discord maken met rollen" (Issue #6, Milestone 0)
 - "CI/CD demo versie klaar" (Issue #10, Milestone 1)
 - "Gitlab milestones aanmaken" (Issue #12, Milestone 1)
 - "Deployment agreement" (Issue #2, Milestone 0, due Nov 21, 2025)
 - "Developers contacteren en in discord steken" (Issue #3, Milestone 0)
 - "Team vormen + eerste meeting" (Issue #5, Milestone 0)
 - "Initiële versies Terraform en Kubernetes" (Issue #11, Milestone 1)
 - "Opentofu bestuderen" (Issue #8, Milestone 1)
 - "Terraform/Google cloud/K8s bestuderen" (Issue #7, Milestone 1)
 - "domeinen kopen" (Issue #17)

Deployment Proces

Na Deployment

- status.sh
 - → live pod monitoring
- verify-fixes.sh
 - → configuratiechecks
- kubectl cluster-info
- Service health checks
- Externe IP validatie

“Na deployment wordt de volledige deployment gemonitord.”



Conclusie

Infrastructuur

- geautomatiseerd

Kubernetes-omgeving

- stabiel
- schaalbaar
- self-healing

DNS & SSL

- geïntegreerd → deploymentproces

Deployment per Team

- geïsoleerd

Monitoring & Validatie