Gaara AI Project

Tools & Technologies Report

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Version: 4.3

1. Docker Containers

1.1 Core Containers

Container	Image	Purpose	Port
PostgreSQL	postgres:16-alpine	Main Database	5432
Redis	redis:7-alpine	Cache & Sessions	6379
Backend	Custom Dockerfile	FastAPI Backend	5000
Frontend	Custom Dockerfile	React Frontend	80/443
Nginx	nginx:1.25-alpine	Reverse Proxy	8080/8443

1.2 Monitoring Containers

Container	Image	Purpose	Port
Prometheus	prom/prometheus:v2.48.0	Metrics Collection	9090
Grafana	grafana/grafana:10.2.2	Dashboards	3001
Elasticsearch	elasticsearch:8.11.0	Search & Analytics	9200
Kibana	kibana:8.11.0	ES Interface	5601

1.3 AI/ML Specialized Containers

1. plant_hybridization - Plant Hybridization
2. plant_disease_advanced - Advanced Plant Disease Detection
3. gpu_processing - GPU Processing
4. image_enhancement - Image Enhancement
5. yolo_detection - YOLO Object Detection
6. adaptive_learning - Adaptive Learning
7. resnet50 - ResNet50 Model
8. diagnosis - Disease Diagnosis
9. analytics - Analytics Processing
10. memory_central - Central Memory System
11. a2a_communication - Agent-to-Agent Communication
12. auto_learning - Automatic Learning

2. Security Tools

2.1 GitHub Actions Security Workflows

Tool	Workflow File	Purpose
Trivy	trivy-security.yml	Vulnerability Scanning
OWASP ZAP	dast_zap.yml	Dynamic Application Security Testing
Secret Scan	secret-scan.yml	Detect Leaked Secrets
SBOM	sbom_supply_chain.yml	Software Bill of Materials

2.2 Trivy Security Tasks

- Filesystem Vulnerability Scan
- Docker Image Scan (Backend)
- Docker Image Scan (Frontend)
- Infrastructure as Code (IaC) Scan
- Secret Detection
- SBOM Generation (CycloneDX format)
- Security Report Summary

2.3 Security Libraries (Backend)

Library	Version	Purpose
python-jose	3.3.0	JWT Signing
passlib	1.7.4	Password Hashing
bcrypt	4.1.2	Encryption Algorithm
cryptography	45.0.4	Cryptographic Operations
PyJWT	2.10.1	JSON Web Tokens
pyotp	2.9.0	TOTP (2FA)
pyOpenSSL	25.1.0	SSL/TLS

3. Testing Tools

3.1 Backend Testing

Tool	Version	Purpose
pytest	8.3.5	Test Framework
pytest-asyncio	0.21.1	Async Testing
pytest-cov	4.1.0	Code Coverage
playwright	1.52.0	E2E Testing
httpx	0.25.2	HTTP Testing Client

3.2 Frontend Testing

Tool	Version	Purpose
vitest	1.0.4	Test Framework
@testing-library/react	14.1.2	React Testing
jsdom	23.0.1	Virtual DOM
storybook	7.6.6	Component Documentation
msw	2.0.11	Mock Service Worker

3.3 Performance Testing

- k6 (perf_k6.yml): Load Testing
- Lighthouse (lighthouse_ci.yml): Frontend Performance

4. AI/ML Tools

Library	Version	Purpose
torch	2.1.1	PyTorch Deep Learning
tensorflow	2.15.0	TensorFlow
scikit-learn	1.3.2	Machine Learning
opencv-python	4.8.1.78	Image Processing
scikit-image	0.22.0	Image Processing
onnx	1.18.0	Model Exchange
coremltools	8.3.0	iOS Model Conversion
numpy	2.3.0	Numerical Computing
pandas	2.3.0	Data Processing
Pillow	11.2.1	Image Library
matplotlib	3.10.3	Visualization

5. Backend Framework

5.1 Core Framework

Library	Version	Purpose
fastapi	0.115.12	API Framework
uvicorn	0.24.0	ASGI Server
pydantic	2.11.7	Data Validation
pydantic-settings	2.1.0	Settings Management
python-dotenv	1.1.0	Environment Variables

5.2 Database

Library	Version	Purpose
sqlalchemy	2.0.23	ORM
alembic	1.13.1	Database Migrations
psycopg2-binary	2.9.10	PostgreSQL Driver
redis	5.0.1	Redis Client
aioredis	2.0.1	Async Redis

5.3 Task Queue

Library	Version	Purpose
celery	5.3.4	Distributed Task Queue
kombu	5.3.4	Message Transport
pika	1.3.2	RabbitMQ Client

6. Frontend Framework

6.1 Core Framework

Library	Version	Purpose
react	18.2.0	UI Framework
react-dom	18.2.0	DOM Rendering
react-router-dom	6.20.1	Routing
vite	5.0.10	Build Tool
typescript	5.3.3	Type Safety

6.2 UI & Styling

Library	Version	Purpose
tailwindcss	3.3.6	CSS Framework
framer-motion	10.16.16	Animations
lucide-react	0.294.0	Icons
@radix-ui/*	various	UI Components
react-hot-toast	2.4.1	Notifications

6.3 State Management

Library	Version	Purpose
zustand	4.4.7	State Management
@tanstack/react-query	5.14.2	Server State
immer	10.0.3	Immutable State
react-hook-form	7.48.2	Form State
zod	3.22.4	Schema Validation

7. CI/CD (GitHub Actions)

Workflow	Purpose
ci.yml	Continuous Integration
deploy.yml	Automatic Deployment
trivy-security.yml	Security Scanning
dast_zap.yml	Dynamic Security Testing
perf_k6.yml	Performance Testing
lighthouse_ci.yml	Frontend Performance
secret-scan.yml	Secret Detection
sbom_supply_chain.yml	Supply Chain Security
pages.yml	GitHub Pages
audit.yml	Security Audit
issues.yml	Issue Management

8. Monitoring & Observability

Tool	Version	Purpose
prometheus-client	0.22.1	Prometheus Metrics
psutil	7.0.0	System Monitoring
evidently	0.7.7	ML Monitoring
langfuse	3.0.1	LLM Monitoring

9. Development Tools

9.1 Backend Development

Tool	Version	Purpose
black	23.12.1	Code Formatting
flake8	6.1.0	Linting
isort	5.13.2	Import Sorting
mypy	1.7.1	Type Checking
pre-commit	3.6.0	Git Hooks

9.2 Frontend Development

Tool	Version	Purpose
eslint	8.55.0	Linting
prettier	3.1.1	Code Formatting
husky	8.0.3	Git Hooks
lint-staged	15.2.0	Staged Files Linting
commitizen	4.3.0	Commit Messages

Summary

* Total Docker Containers: 25+

* Total Backend Libraries: 80+

* Total Frontend Libraries: 100+

* Security Workflows: 4

* CI/CD Workflows: 11

* AI/ML Frameworks: 3 (PyTorch, TensorFlow, scikit-learn)