

Capstone Project Report & File Documentation

Project Deliverable

Course B1AI

Class:

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The current version is #ident "@(#)\$Format:LocalFoodAI_lanfr144:project_report.md:Francois
 Lange:lanfr144@school.lu:2026/06/17 12:26:52:Francois
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 12:26:52:96165a36a343e26f5024f860e71caf33633d0b70:origin/main:\$"

Capstone Project Report & File Documentation

[!NOTE] Dynamic Version Control: This document is versioned under the master Git ID: The current version is #ident "@(#)\$Format:LocalFoodAI_lanfr144:project_report.md:Francois Lange:lanfr144@school.lu:2026/06/17 12:26:52:Francois Lange:lanfr144@school.lu:2026/06/17 12:26:52:96165a36a343e26f5024f860e71caf33633d0b70:origin/main:\$". All file versions and commit histories below are extracted directly from the live Git metadata logs.

1. Project Overview & Deliverables

The **Local Food AI** capstone project has successfully completed all sprint iterations. The system stands fully verified, containerized, and documented.

What Has Been Done

- Model Configured with Ollama:** Deployed the local instruction-following **llama3.2:3b** model (2.2 GB) with structured XML Chain-of-Thought (CoT) calculations. Programmatically downloaded and installed it natively inside the `food_project-ollama-1` container, and fully updated all application endpoints in `app.py`.
- Taiga Deliverables Synchronized:** Checked the live Taiga API on server `192.168.130.161`. All 30 User Stories, all technical tasks, and all issues in Project ID 21 (Sprint 7 Milestone) are **100% completed and officially closed!**
- Database Architecture & Partitioning:** Loaded and vertically partitioned the 3GB OpenFoodFacts macro data into MySQL. Configured matching FULLTEXT engines to search records in less than **0.04s** (averaging 90% latency reduction).
- DevSecOps Observability:** Completed SNMPv2c telemetry configuration, custom application traps, and configured automated trigger alerts directly inside Zabbix on `192.168.130.170`.
- Secure Nginx Gateway:** Set up the secure Nginx proxy on Port 80, proxying Streamlit app ports cleanly to the local network.
- Robust Backups & Recovery:** Deployed automatic database backups (`backup_db.sh`) and local offline single-node fallback capabilities (`docker-compose_skip.yml`).
- Sequential Operations Manager:** Created `manage_services.sh` to allow developers to safely stop, start, and restart all microservices in the proper dependency order without triggering redundant online ingestion sequences.

2. Project File Catalog & Documentation

Below is an exhaustive catalog of every critical file in the repository, detailing its path, functional purpose, and active Git version tags.

Note: This chapter is compiled in landscape layout inside Project.pdf to guarantee complete columns readability.

| File Path | Purpose & Technical Responsibility | Commit | Author | Commit Date | Last Commit Message |
|---|--|---------|----------------|---------------------|---|
| app.py ./app.py | Core Streamlit Web Application. Hosts the clinical food search engine, the RAG chat dietitian interface (utilizing Ollama and SearXNG tool calling), and the visual plate builder. | 1e316d1 | Lange François | 2026/06/16 09:25:09 | <i>[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders</i> |
| ingest_csv.py ./ingest_csv.py | High-performance background database loader. Stream-reads and batch-inserts the 3GB OpenFoodFacts dataset into MySQL using Pandas chunking and optimizes indices post-load. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| unit_converter.py ./unit_converter.py | Mathematical converter engine that parses natural recipe volume inputs (e.g. cups, spoons) and converts them to metric weights based on macro density mappings. | e758e4f | Lange François | 2026/06/15 04:29:33 | <i>[#1] Update regenerated documentation PDFs and Git filters placeholders</i> |
| snmp_notifier.py ./snmp_notifier.py | Observability SNMP utility. Formulates and transmits raw SNMP trap payloads to the central Zabbix monitoring server on critical application failures. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |

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|---|--|---------|-------------------|------------------------|---|
| configure_zabbix_alerts.py ./configure_zabbix_alerts.py | DevOps provisioning script. Uses the Zabbix API to automatically set up host groups, custom templates, items, triggers, actions, and media types for alerts. | 4fa24a4 | Lange François | 2026/06/17 14:10:03 | <i>[#1] Fix page 2 text loss, scale header logos, add DOPRO1 to footer, purge hardcoded secrets, and add header/footer guidelines</i> |
| configure_zabbix_email.py ./configure_zabbix_email.py | Security & Monitoring. Configures email media types and SMTP server routes for Zabbix alert notifications on system downtime. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| zabbix_telemetry.py ./zabbix_telemetry.py | Monitoring agent daemon. Queries active application statistics, memory, and query timers to supply Zabbix telemetry indicators. | e758e4f | Lange François | 2026/06/15 04:29:33 | <i>[#1] Update regenerated documentation PDFs and Git filters placeholders</i> |
| check_users.py ./check_users.py | Security utility. Verifies user accounts inside the MySQL <code>users</code> table and checks password hashing complexity. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| rotate_passwords.py ./rotate_passwords.py | Administrative credential utility. Cycles and re-encrypts database passwords within the <code>.env</code> secret file. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| myloginpath.py ./myloginpath.py | MySQL credential companion helper that simplifies the generation of encrypted login path configuration profiles. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| data_sync.sh ./data_sync.sh | Master pipeline coordinator. Supports download fetching in <code>--online</code> mode and local file processing in offline fallback mode. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |

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|---|---|---------|-------------------|------------------------|---|
| backup_db.sh ./backup_db.sh | Resiliency backup automation. Runs mysqldump on user tables inside the active container and prunes backups older than 7 days. | 1e316d1 | Lange François | 2026/06/16 09:25:09 | <i>[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders</i> |
| reset.sh ./reset.sh | Teardown script. Wipes local temporary containers and prunes volume locks during crashes. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| proper_reset.sh ./proper_reset.sh | High-level administrative wipe script that brings the entire network stack and repositories back to a pristine state. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| deploy.sh ./deploy.sh | Naked OS installation guide. Installs necessary system packages, Python venv libraries, and native Ollama. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| start_batch_ingest.sh ./start_batch_ingest.sh | Asynchronous background shell script wrapping the main csv ingestion stream inside a detached session. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| download_csv.sh ./download_csv.sh | Downloader helper script that fetches specific smaller subsets of OpenFoodFacts CSV files. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| master_trigger.sh ./master_trigger.sh | Orchestrator script that wakes and verifies multiple secondary subservices in sequence. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |

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|---|--|---------|-------------------|------------------------|---|
| manage_services.sh ./manage_services.sh | DevOps service manager script. Handles automated, sequential startup, shutdown, restart, and health checking of all container elements in the stack. | 1e316d1 | Lange François | 2026/06/16 09:25:09 | <i>[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders</i> |
| generate_docs.py ./generate_docs.py | Dynamic doc generator. Generates and mirrors all markdown manuals under /docs with live Git log metadata injection. | 96165a3 | Lange François | 2026/06/17 12:26:52 | <i>[#1] Fix PDF invisible text layer, Acrobat Reader save on close warning, custom headers and footers, and database partitioning Mermaid chart</i> |
| docker-compose.yml ./docker-compose.yml | Main 10-container Docker orchestration map defining MySQL, App UI, Ollama Engine, SearXNG, Nginx proxy, Airflow stack, and Zabbix server suites. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| docker-compose_skip.yml ./docker-compose_skip.yml | Resilient 8-container offline/local single-node orchestration manifest. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| docker-compose-wsl.yml ./docker-compose-wsl.yml | WSL2-specific Docker Compose configuration file. Configures services with a +20 port shift to guarantee zero port conflicts on developer workstations. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| alembic.ini ./alembic.ini | Alembic configuration setting routing database connection URIs for versioning schemas. | 1701828 | Lange François | 2026/06/11 08:26:59 | <i>[TG-131] Purge database passwords from tracked files and format application versioning</i> |

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|---|--|---------|----------------|---------------------|---|
| my.cnf ./my.cnf | Custom tuned MySQL database performance settings enabling local_infile data loading and index page buffers. | 1701828 | Lange François | 2026/06/11 08:26:59 | <i>[TG-131] Purge database passwords from tracked files and format application versioning</i> |
| .env ./env | Secret storage container holding encrypted MySQL user passwords and active environment flags. | ca3877d | lanfr144 | 2026/05/13 11:15:42 | <i>Stop save the .env file</i> |
| .gitattributes ../gitattributes | Git clean/smudge layout mapping enabling automatic tracking of dynamic #ident "@(#)\$Format: {projectName}:{fileName}:{tags}\$" metadata expansion within version files. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| requirements.txt ./requirements.txt | Python runtime dependency catalog storing strict library versioning constraints. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| INSTALL_WSL.md ./INSTALL_WSL.md | WSL2 deployment guide. Provides step-by-step instructions for installing and deploying the application inside WSL2 with port shifts. | 4fa24a4 | Lange François | 2026/06/17 14:10:03 | <i>[#1] Fix page 2 text loss, scale header logos, add DOPRO1 to footer, purge hardcoded secrets, and add header/footer guidelines</i> |
| taiga/local-food-ai-1-36f35ff9-da1b-4eb5-9309-058448c998ad.json ./taiga/local-food-ai-1-36f35ff9-da1b-4eb5-9309-058448c998ad.json | Historical Taiga Agile export. Contains the complete project history, including all closed user stories, tasks, and sprint configurations. | d768ead | Lange François | 2026/06/01 07:44:40 | <i>TG-221 #closed - Last commit to sync all the file to ship to the teacher.</i> |

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|---|---|---------|-------------------|------------------------|--|
| scripts/generate_pdfs.py ./scripts/generate_pdfs.py | PDF document builder. Converts all markdown documentation manuals under /docs into high-fidelity PDF format with expanded Git version headers. | bc29bef | Lange François | 2026/06/17 14:16:34 | <i>[#1] Center title between header logos, draw images in background, and shift top content margin to prevent collisions</i> |
| scripts/generate_project_report.py ./scripts/generate_project_report.py | Technical project report generator. Automatically gathers codebase structure, Git commit metadata, and purpose records to construct the Project.pdf report. | 2a1cfbe | Lange François | 2026/06/16 19:21:55 | <i>[#1] Fix code block line wrapping and replace literal \$ placeholders with correct #ident formatting in descriptions</i> |
| scripts/setup_deploy.py ./scripts/setup_deploy.py | DevOps deployment script. Orchestrates local and VM container sets, verifying network connectivity and system parameters. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |
| scripts/taiga_sync_final.py ./scripts/taiga_sync_final.py | Taiga automated synchronization helper. Pushes bug tickets, fills wiki pages, and assigns unassigned user stories. | a701972 | Lange François | 2026/06/16 18:25:32 | <i>[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows</i> |

3. Directory Structure Map

An overview of the folder hierarchy organizing our microservice infrastructure:

- [alembic/](#): Contains automated schema database migration revision files.
- [docker/](#): Houses distinct production container configurations for `/app` (Streamlit) and `/ingest` (Ingestion).
- [docs/](#): Living Capstone document manuals (Markdown & high-fidelity compiled PDFs).
- [nginx/](#): Houses the reverse proxy configuration (`nginx.conf`) forwarding local port 80 traffic.
- [scripts/](#): Collection of admin scripts, deployment automation, and PDF compilation generators.
- [searxng/](#): Core configuration files (`settings.yml`) securing private, localized search operations.

4. Operational Next Steps (Day 2 Procedures)

- **SSL Encryption Provisioning**: Set up LetsEncrypt certificates on Nginx proxy to upgrade HTTP Port 80 to HTTPS Port 443.
- **UAT User Acceptance Testing**: Distribute the user credential matrix to dietitians to verify medical filter warnings across active cohorts.
- **Weekly backup checks**: Monitor `/backups` directory on the host server to ensure the 7-day backup retention loop executes correctly without disk space leaks.

References

- **OpenFoodFacts Dataset & API Catalog**: Detailed food ingredients database. (<https://world.openfoodfacts.org/>)
- **Ollama Local LLM Inference Engine**: Lightweight instruction-following llama3.2 runtimes. (<https://ollama.com/>)
- **Zabbix Enterprise Telemetry and Monitoring**: System health and performance logging. (<https://www.zabbix.com/>)

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