

The current version is #ident "@(#) \$Format:LocalFoodAI\_lanfr144:project\_report.md:Francois Lange:lanfr144@school.lu:2026/06/16 09:25:09:Francois Lange:lanfr144@school.lu:2026/06/16 09:25:09:1e316d1030d64b01b8cbc5cdb3a3a272a963caff:: \$"

# 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:2026/06/16 09:25:09:Francois Lange:lanfr144@school.lu:2026/06/16 09:25:09:1e316d1030d64b01b8cbc5cdb3a3a272a963caff:: \$". All file versions and commit histories below are extracted directly from the live Git metadata logs.

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## 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 Upgraded to Ollama Latest:** Transitioned from the `llama3.2:3b` model to the much more robust, large reasoning-focused `qwen2.5:7b` model (4.7 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.
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## 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
<b>app.py</b> ./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	[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders
<b>ingest_csv.py</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>unit_converter.py</b> ./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	[#1] Update regenerated documentation PDFs and Git filters placeholders

<b>snmp_notifier.py</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>configure_zabbix_alerts.py</b> ./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.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>configure_zabbix_email.py</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>zabbix_telemetry.py</b> ./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	[#1] Update regenerated documentation PDFs and Git filters placeholders
<b>check_users.py</b> ./check_users.py	Security utility. Verifies user accounts inside the MySQL users table and checks password hashing complexity.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>rotate_passwords.py</b> ./rotate_passwords.py	Administrative credential utility. Cycles and re-encrypts database passwords within the .env secret file.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows

<b>myloginpath.py</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>data_sync.sh</b> ./data_sync.sh	Master pipeline coordinator. Supports download fetching in --online mode and local file processing in offline fallback mode.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>backup_db.sh</b> ./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	[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders
<b>reset.sh</b> ./reset.sh	Teardown script. Wipes local temporary containers and prunes volume locks during crashes.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>proper_reset.sh</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>deploy.sh</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>start_batch_ingest.sh</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows

<b>download_csv.sh</b> ./download_csv.sh	Downloader helper script that fetches specific smaller subsets of OpenFoodFacts CSV files.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>master_trigger.sh</b> ./master_trigger.sh	Orchestrator script that wakes and verifies multiple secondary subservices in sequence.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>manage_services.sh</b> ./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	[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders
<b>generate_docs.py</b> ./generate_docs.py	Dynamic doc generator. Generates and mirrors all markdown manuals under / docs with live Git log metadata injection.	6caac32	Lange François	2026/06/16 19:07:16	[#1] Remove emojis from markdown manuals to eliminate system symbol font dependencies, and use portable relative font paths in CSS
<b>docker-compose.yml</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>docker-compose_skip.yml</b> ./docker-compose_skip.yml	Resilient 8-container offline/local single-node orchestration manifest.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows

<b>docker-compose-wsl.yml</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>alembic.ini</b> ./alembic.ini	Alembic configuration setting routing database connection URIs for versioning schemas.	1701828	Lange François	2026/06/11 08:26:59	[TG-131] Purge database passwords from tracked files and format application versioning
<b>my.cnf</b> ./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	[TG-131] Purge database passwords from tracked files and format application versioning
<b>.env</b> ./env	Secret storage container holding encrypted MySQL user passwords and active environment flags.	ca3877d	lanfr144	2026/05/13 11:15:42	Stop save the .env file
<b>.gitattributes</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>requirements.txt</b> ./requirements.txt	Python runtime dependency catalog storing strict library versioning constraints.	a701972	Lange François	2026/06/16 18:25:32	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>INSTALL_WSL.md</b> ./INSTALL_WSL.md	WSL2 deployment guide. Provides step-by-step instructions for installing and deploying the application inside WSL2 with port shifts.	129180a	Lange François	2026/06/15 12:49:05	[#1] Add Developer and Agent Productivity Guidelines to guides and agent workflows

<b>taiga/local-food-ai-1-36f35ff9-da1b-4eb5-9309-058448c998ad.json</b> ./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	TG-221 #closed - Last commit to sync all the file to ship to the teacher.
<b>scripts/generate_pdfs.py</b> ./scripts/generate_pdfs.py	PDF document builder. Converts all markdown documentation manuals under /docs into high-fidelity PDF format with expanded Git version headers.	6caac32	Lange François	2026/06/16 19:07:16	[#1] Remove emojis from markdown manuals to eliminate system symbol font dependencies, and use portable relative font paths in CSS
<b>scripts/generate_project_report.py</b> ./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.	1e316d1	Lange François	2026/06/16 09:25:09	[#1] Render Mermaid flowcharts, relative cross-linking, and clean up RCS \$ placeholders
<b>scripts/setup_deploy.py</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows
<b>scripts/taiga_sync_final.py</b> ./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	[#1] Fix PDF corruption via renormalization and add Uninstall Guide for WSL and Windows

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### 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.
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### 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.