

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 Lange:lanfr144@school.lu:2026/06/17 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>

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 users 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 .env 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 --online 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>

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>

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>

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>

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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