

Technology Used In The Enterprise E-Commerce Engines

Guiding Principles

Melior is guided by the principles of skill, scalability and security.

We believe that microservice-architecture running in a secure cloud environment best fits our present needs. In this way we are not saddled with a monolith that becomes harder to maintain and evolve but are equipped with a swappable set of tools and services that can be effectively managed, can evolve organically and be independently improved.

This approach allows us to research faster and experiment, which in turn allows us to offer more frequent feature releases.

Our Chatbots: How they work

From a high level overview, our chatbot solutions can be divided into three abstract components:

Conversational Channel/Interface:

A conversational interface provides the user with a familiar mechanism to communicate with the e-commerce platform through the AI. It allows for standard methods of communication and interaction through written text, emojis, images, hyperlinks, location or voice.

Additionally, many of the conversational channels provide applications for all major smartphone and web applications. This means that the users' conversation and their context are simultaneously accessible from a variety of devices at any time.

Artificial Intelligence Engine:

A process of information extraction and understanding is necessary behind the chat interface to bridge the gap between content interpretable by a human user (i.e. human language or visual information) and an e-commerce catalogue system.

E-Commerce platforms are in general composed by databases where product retrieval is done by means of some formal language (i.e.: SQL or API interface).

However, building a rule based system capable of mapping human expressibility to such databases becomes an impossible task, given the infinite amount of ways humans communicate.

An AI based approach, on the other hand, allows our solution to better cope with the way a human would interact in reality if they were talking to another human, and, more importantly, learns over time how to do it better.

The AI engine understands user inputs (utterances/images/emojis,etc.) and extracts necessary information (i.e.: user goal or intent, product information, time or geographical information) to pull up the relevant information that responds to a user's initial query.

Different engines for different content:

- The *Natural Language Understanding Engine* provides the understanding of the user's written messages, identifying useful pieces of information to achieve the desired goal. (i.e.: message language, message intent or topic, objects, attributes, dates, places, names, quantities etc.). It also identifies other aspects of written communication that are not directly related with the content but are attributed more to the user's style. (i.e.: sentiment, formality, tone, subjectivity, toxicity and so forth).
- The *Image Understanding Engine* focuses on the semantic meaning of an image, its components, colours, and textures in order to translate an image into a unique compressed representation; "an image signature." These signatures are then used to search for similar images in a catalogue. It also identifies and reads from potential regions of interest in the image (i.e.: barcodes, labels, text, icons) thereby providing an additional mechanism of communication.

These engines are integral to the success of our AI chatbots that efficiently and effectively interpret user queries effortlessly.

E-Commerce Platform

The e-commerce platform exists at the other end of the system i.e. the commerce catalogue, shop, or back-end of what the user would traditionally see through a website or phone application.

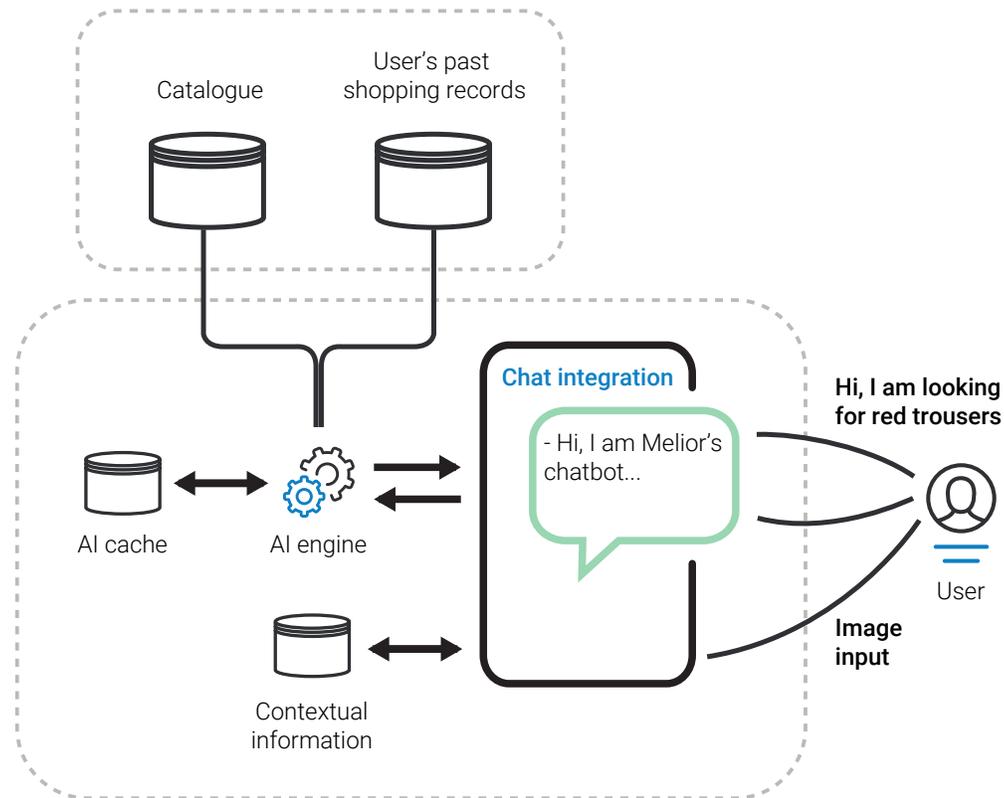
Once the user's messages are translated into a set of instructions

understandable by the e-commerce platform, the platform is in charge of providing information relating to available articles or products e.g. we extract buy, red trousers, size M. The e-commerce system processes that information and replies: buy (yes), red trousers (yes), size M (no, size S, L, XL).

A user's needs are met swiftly and simply, leading to greater customer satisfaction and higher outcomes.

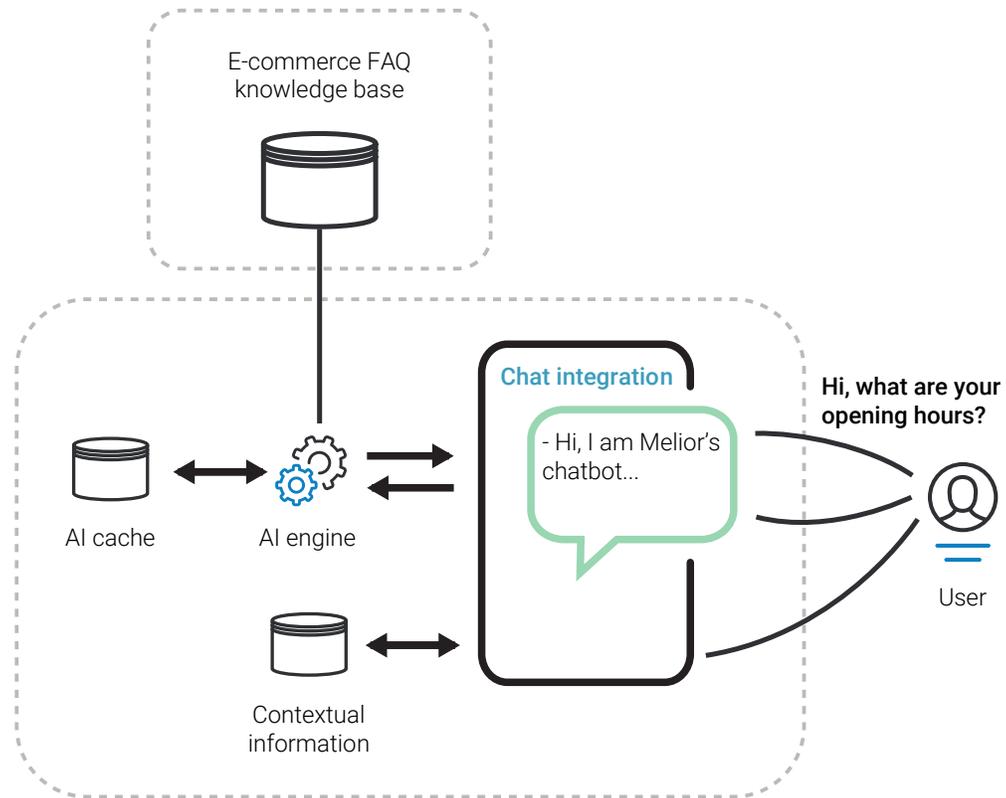
Our Chatbots: Architecture & Engineering

High Level Architecture



MILA's High level architecture diagram

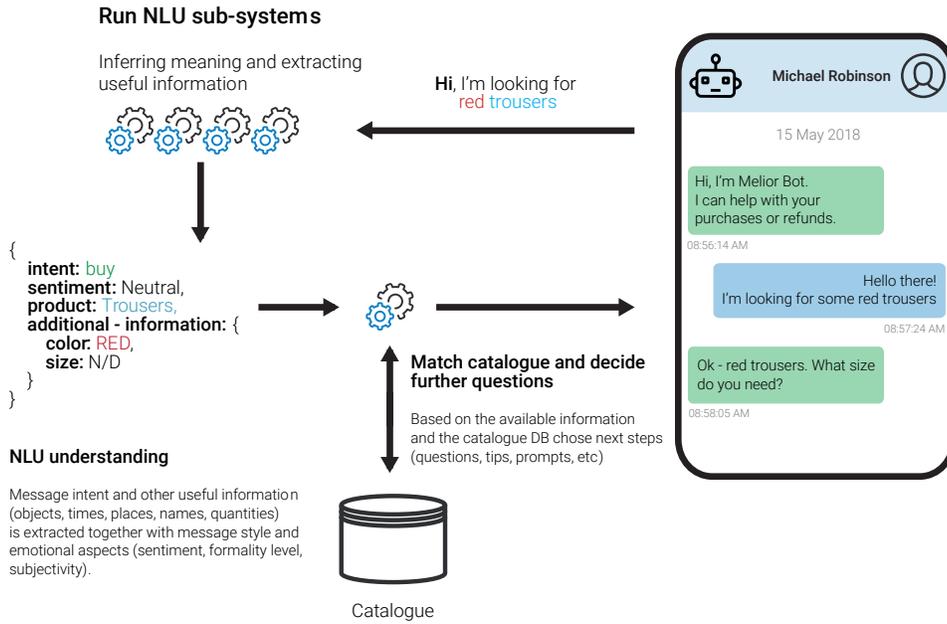
1. A user communicates through the chat channel (text, voice, images, emojis, etc.).
2. The messages/images are read by the AI engine to determine the user intent and extract important information to carry out the command. Based on the provided and extracted information, the AI engine determines the next questions to be asked or steps to be taken.
3. When enough information is gathered to complete the action required by the user (e.g. purchase a product), the catalogue is queried to retrieve the necessary information (item price, characteristics, availability etc.), which is then sent back to the user.



MAX's High level architecture diagram

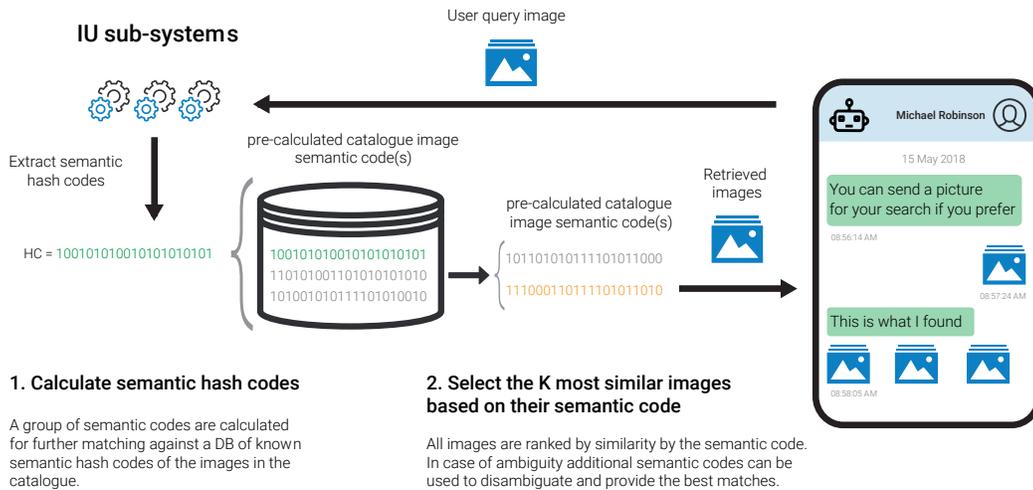
1. A user communicates through the chat channel (text, image, emojis, etc).
2. The user's messages are interpreted by the AI engine allowing MAX to understand what information is the user looking for.
3. Once the topic is known MAX queries the knowledge base to find the appropriate answer, before sending it back to the user.

Natural Language Understanding Architecture Diagram



The NLU Engine extracts content and style information from the user's message and determines what the next actions are.

Image Search Architecture Diagram



The Image Search Engine computes the semantic codes (a sort of unique image signature) of the user's origin image and compares it against known signatures to retrieve the K most similar ones.

Melior is running a micro-service architecture: restful, scalable & dockerised services deployed on the cloud.

- We implement CI/CD methodology.

- We use Github to store our codebase.
- We use a simplified Git Flow methodology.

Backend

- Melior's AI is written mostly in Python and we build upon some very well known open source libraries:
 - ◇ [TensorFlow](#) & [PyTorch](#)
 - ◇ [Sklearn](#) & [Scipy](#)
- Our AI models are never trained mixing different clients data, which guarantees that no information is leaked between clients.
- All our AI models are running in [Docker](#) container which allows for scalability on demand and isolated execution.
- AI experimentation and results are saved in MongoDB.
- The produced AI trained models are stored in S3 per client.
- Python is the established data science language given the extensive tools and libraries available for Machine Learning / Deep Learning and in general statistics or scientific fields.
- Our e-commerce integrations are written in node.js and use express where appropriate.
- Our chatbot channel integrations are written in node.js using [Bottender](#) and we leverage a number of open-source frameworks.

Storage & Database

Melior uses [MongoDB](#) and [Redis](#) for search acceleration and session management.

The JSON-like documents structure of MongoDB makes it the best choice to deal with the variety of information found in diverse catalogues and chats because MongoDB does not require having fixed schema in tables as relational databases. In addition *MongoDB* provides horizontal scalability and text search.

- S3 storage for models.
- We respect GDPR and allocate our data storage accordingly.
- Our front-end is written in react/js.
- We enforce the use of HTTPS/encryption.

We enforce strict data separation between different users. Client data is only accessible within their private stacks.