
Xatkit: A model-based chatbot development framework - Extended Abstract

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KEYWORDS: *chatbot, bot, low-code, DSL*

Instant messaging platforms have been widely adopted as one of the main technologies to communicate and exchange information. Nowadays, most of them provide built-in support for integrating *chatbot applications*, which are automated conversational agents capable of interacting with users of the platform. Chatbots have proven useful in various contexts to automate tasks and improve the user experience, such as automated customer services, education, and e-commerce. Chatbot design will become a key ability in IT hires in the near future.

This widespread demand has emphasized the need to be able to quickly build non-trivial chatbot applications supporting AI-based natural language processing (NLP) and being capable of taking part in orchestrations (Brambilla *et al.*, 2009) of internal and external services to carry out user requests. As such, chatbots are becoming complex software artifacts that require a methodical development approach encompassing a variety of technical domains, ranging from NLP to a deep understanding of the APIs of the targeted instant messaging platforms and third-party services. So far, chatbot development platforms have mainly addressed the NLP challenge, typically by relying on external *intent recognition providers*, which are NLP frameworks providing user-friendly interfaces to define conversation assets. As a trade-off, chatbot applications are tightly coupled to those providers, hampering their maintainability and reusability. Similarly, current chatbot platforms lack proper abstraction mechanisms to easily integrate and communicate with other external platforms the bot needs to interact with.

We aim to tackle all these issues by raising the level of abstraction at what chatbots are defined. To this purpose, we introduce Xatkit (Daniel *et al.*, 2020), a novel model-based chatbot development framework that aims to address this question using Model Driven Engineering (Brambilla *et al.*, 2017) techniques: domain-specific languages, platform independent bot definitions, and runtime interpretation. Indeed, Xatkit embeds a dedicated chatbot-specific modeling language to specify user intentions, computable actions and callable services, combining them in rich conversation flows.

The resulting chatbot definition is independent of the intent recognition provider (which can be configured as part of the available Xatkit options) and frees the designer from the technical complexities of dealing with messaging and backend platforms as Xatkit can be deployed through the Xatkit runtime component on them without performing any additional steps. The Xatkit framework is open source¹.

Xatkit is ready to be used in real-case scenarios. But it has still plenty of room for improvements. At the language level we plan to improve the variability of the bot specification, moving towards a product-line approach that enables companies to create and quickly update several versions of the same bot (e.g. to create localized versions of the bot for each branch of the company). At the framework level, we plan to work on the integration of chatbot generators, able to create partial bot specifications from existing data sources within the company (e.g. FAQs or user guides). We also plan to study the combination of sentiment analysis and behavioural design patterns (Fogg, 2002) to create more likeable and effective chatbots (Ren *et al.*, 2019). Finally, security and access-control is another important aspect of any chatbot design as we may want to allow users to query (or not) certain aspects of our data depending on their profile.

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1. <https://github.com/xatkit-bot-platform>