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A Conversational AI Approach to Architecture Framework Reviews

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ABSTRACT

Architecture framework reviews (AFRs) are valuable tools offered by cloud infrastructure providers to enable customers to validate their implementation against a set of curated architectural best practices. AFRs are currently offered via self-service questionnaires, which tend to be inflexible, or via reviews by human experts, which, although guided, are less accessible and more expensive. This disclosure describes a conversational artificial intelligence (AI) interface (chatbot) that enables dialog-based architecture framework reviews and alignment assessment. The described automated self-service tool has natural language capabilities that enable dialog-based interactions and guidance, and draws from a pool of static questions to pose architectural framework review questions (AFRQ). The user provides answers in a natural language, unstructured format. The answers are interpreted by AI using natural language understanding (NLU) and are mapped to a level of alignment or maturity. Since NLU is used, an exact text match or static logical mapping are not required.

KEYWORDS

- Conversational AI

- Chatbot

- Architecture framework

- Architecture framework review (AFR)

- Cloud computing

- Artificial intelligence (AI)

- Natural language understanding (NLU)

BACKGROUND

An architecture framework of a cloud computing system provides principles and practices for creating and using the architecture of the cloud computing system. Architecture framework review (AFR) is a process that validates and, optionally, quantifies the alignment of the design and implementation of a system against an architecture framework. AFRs are valuable tools offered by cloud infrastructure providers that enable customers to validate their implementation against a set of curated architectural best practices. Currently, assessments are offered in two ways:

1. Via self-service tooling, performed with static questionnaires, using multiple-choice, multi-select forms.

2. A review conducted by a professional, e.g., a consultant or a solutions architect in the context of a formal engagement, performed manually in an interview style. This mode typically uses the same self-service tool as (1) but offers a guided experience.

Both techniques have their shortcomings. For example, items on the self-service questionnaire can be subject to the user's interpretation, and multiple-choice questions have little room for flexible (gray area) responses. It is these shortcomings of the self-service questionnaire that led cloud providers to offer professionally led engagements, which, however, have their own shortcomings, e.g., lesser accessibility and greater cost.

DESCRIPTION

This disclosure describes a conversational artificial intelligence (AI) interface (or chatbot) that implements natural language understanding (NLU) techniques to enable dialog-based architecture framework reviews and alignment assessment. The described automated self-service tool has natural language capabilities that enable dialog-based interactions and guidance,

and effectively combines the current AFR modes of self-service questionnaire and professional review.

Per the techniques, the NLU-based self-service tool draws from a pool of static questions to pose an architectural framework review question (AFRQ). The user provides an answer. The NLU-based self-service tool can ask further clarifying questions (CQ), followed by the user providing clarifying answers (CA). The series of answers provided by the user are interpreted by AI using natural language understanding (NLU) and are mapped to a level of alignment/maturity (e.g., a maturity score on a numerical scale, or a categorical maturity level such as low/medium/high). Since NLU is used, an exact text match or any kind of static logical mapping are not required.

Example interaction as part of an AFR

Conversational AI Agent [AFRQ]: Do you manage infrastructure changes with code?

Sample answers:

- Yes, all infrastructure changes are performed from code.
- Partially.
- Some parts of the infrastructure.
- Almost 100%.

The above interaction results in an NLU-derived mapping illustrated in Fig. 1, wherein a question from the conversational agent (102) is shown with various answers (104) (e.g., selected by different users) Based on the answers, a maturity score (106), e.g., "High," "Medium," or "Low" can be determined.
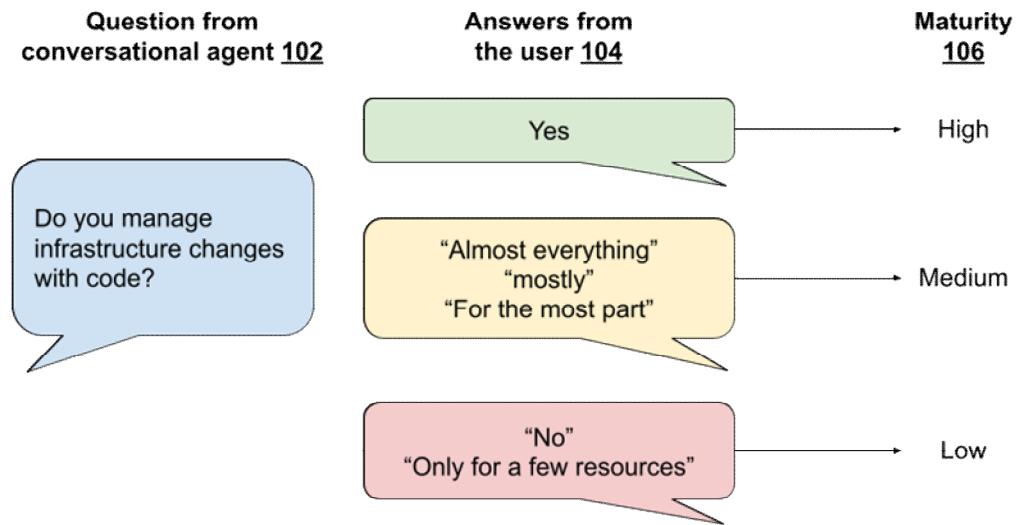
Fig. 1: NLU-derived mapping of user-provided answers to maturity levels

Example interaction that includes clarifying questions

The user or the conversational AI can optionally ask clarifying questions or express a lack of understanding, as the following example conversation illustrates:

Conversational AI agent [AFRQ]: Do you manage infrastructure changes with code?

User [CQ]: What does that mean?

Conversational AI agent [CA]: Managing infrastructure changes with code means [...].

User [CA]: Ah, I understand. Yes, I do manage infrastructure changes with code.

Conversational AI agent [CQ]: Does that cover all infrastructure in production?

User [CA]: With a few exceptions.

In the above interaction, CQ is a clarifying question and CA is a clarifying answer. Once maturity score/alignment levels have been assigned to various AFR items, the conversational AI agent can provide recommendations in the form of, for example, links to documentation and

educational resources; an improvement plan to address low-maturity and medium-maturity items; example code snippets and remediation plan for low-maturity items; etc.
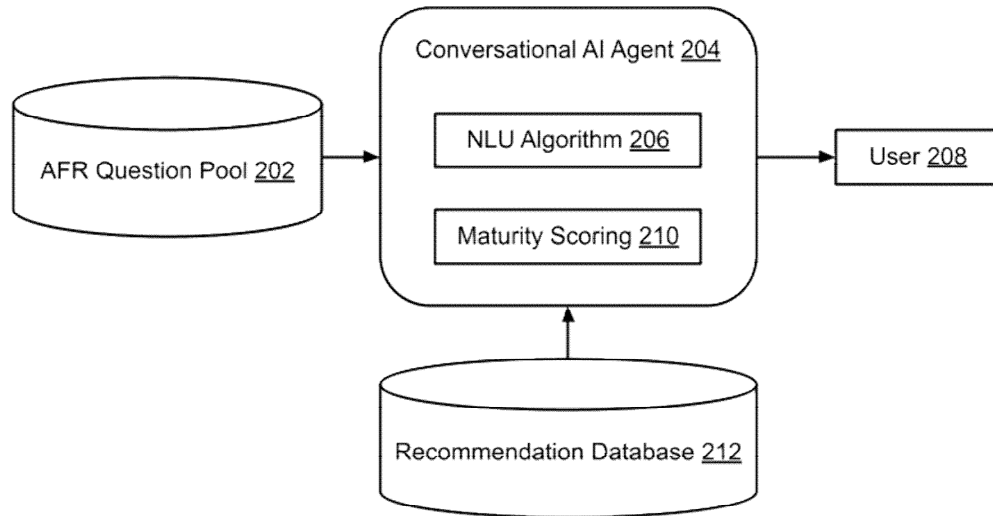

Fig. 2: Components of an NLU-based AFR

Fig. 2 illustrates components of an NLU-based AFR. As explained earlier, the AFR question pool (202) is a database of architectural framework review questions. The conversational AI agent (204) is a software agent that implements NLU-based techniques (206) to interpret user input. The user (208) is a human that interacts with the conversational AI agent. The agent-user interaction can happen over any suitable interface such as a graphical user interface, a terminal-based interface, a voice interface, etc. Maturity scoring (210) can be a software component that, given the output interpretation of the conversational AI agent for a given answer, assigns a maturity score or alignment level. Recommendation database (212) is a database of recommended steps a user can take to bring their implementation in alignment with curated architectural best practices.

CONCLUSION

This disclosure describes a conversational artificial intelligence (AI) interface (chatbot) that enables dialog-based architecture framework reviews and alignment assessment. The described automated self-service tool has natural language capabilities that enable dialog-based interactions and guidance, and draws from a pool of static questions to pose architectural framework review questions (AFRQ). The user provides answers in a natural language, unstructured format. The answers are interpreted by AI using natural language understanding (NLU) and are mapped to a level of alignment or maturity. Since NLU is used, an exact text match or static logical mapping are not required.

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