

Conversational Information Seeking: Theory and Application

 #TheCISTutorial

Part 1: Introduction and Applications



About #TheCISTutorial

- <https://cis-tutorial.github.io/>
- A full day tutorial (six hours)
- Target audience:
 - Researchers who work on conversational information seeking and related areas
 - Students who want to know more about this topic
- Prerequisites:
 - Familiarity with general IR concepts (indexing, querying, evaluation)
 - Basic understanding of machine learning and deep learning concepts and familiarity with key algorithms

Who Are We?



Jeff Dalton
University of Glasgow



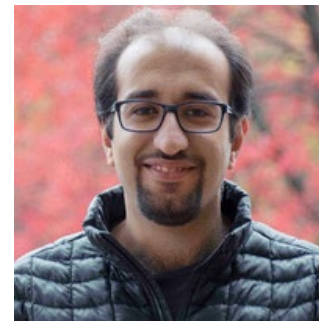
Filip Radlinski
Google



Federico Rosetto
University of Glasgow



Johanne R. Trippas
RMIT University



Hamed Zamani
Uni. of Massachusetts Amherst

The CIS Book!

- A draft is available at <https://arxiv.org/pdf/2201.08808.pdf>

Foundations and Trends in
Information Retrieval
(to appear)

Conversational Information Seeking

**Hamed Zamani, Johanne Trippas, Jeff Dalton,
and Filip Radlinski**

now
the essence of knowledge

Winners of the Alexa Prize TaskBot Challenge



Preparation for the Hands-on Session

- Part 1: LLMs User Simulation
 - Get an OpenAI API key
 - Sign up at <https://platform.openai.com/overview>
- Part 2: Open Assistant Toolkit
 - Clone the repo <https://github.com/grill-lab/OAT.git>
 - Install the dependencies
 - curl, unzip, and docker
 - Build the system
 - `docker compose build grill_common`
 - `docker compose up --build`

Morning Schedule

| Time | Topic | Presenter | Associated Material |
|---------------|--|--------------------|-------------------------|
| 9:00 – 9:45 | Introduction, Applications, and Historical Context | Zamani | CIS Ch 1-2 & Appendix A |
| 9:45 – 10:15 | Large Language Models and Retrieval Augmentation | Zamani | |
| 10:15 – 10:30 | Evaluating CIS Systems | Radlinski (remote) | CIS Ch 7 |
| 10:30 – 11 | COFFEE BREAK | | |
| 11 – 11:30 | Evaluating CIS Systems (cont'd) | Radlinski (remote) | CIS Ch 7 |
| 11:30 – 12 | Understanding Conversational Interactions | Dalton | CIS Ch 4 |
| 12 – 12:30 | Conversational Response Ranking and Generation | Dalton | CIS Ch 5 |
| 12:30 – 13:30 | LUNCH | | |

Afternoon Schedule

| Time | Topic | Presenter | Associated Material |
|---------------|---|-----------|----------------------------------|
| 13:30 - 14 | Mixed-Initiative Interactions | Zamani | CIS Ch 6 |
| 14 – 14:30 | Conversational Interfaces and Result Presentation | Trippas | CIS Ch 3 |
| 14:30 – 15 | Hands-on | Rosseto | OpenGRILL, TaskMAD & iCAST |
| 15 – 15:30 | COFFEE BREAK | | |
| 15:30 – 16:45 | Hands-on (Cont'd) | Rosseto | OpenGRILL, TaskMAD & iCAST |
| 16:45 - 17 | Conclusion and Future Direction | Trippas | CIS Ch 8 |

Why Conversational Information Seeking?



Recent advances in automatic speech recognition



Popularity of devices with limited bandwidth interfaces

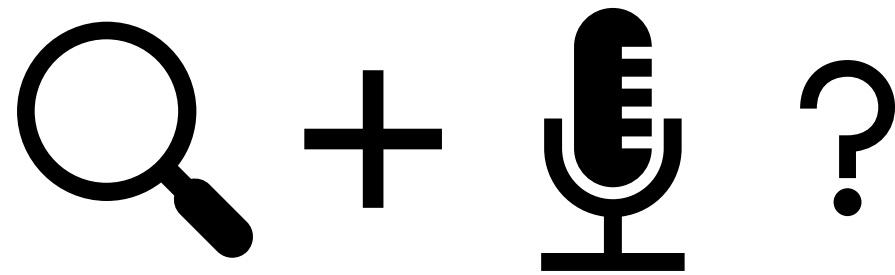


Recent advances in neural models

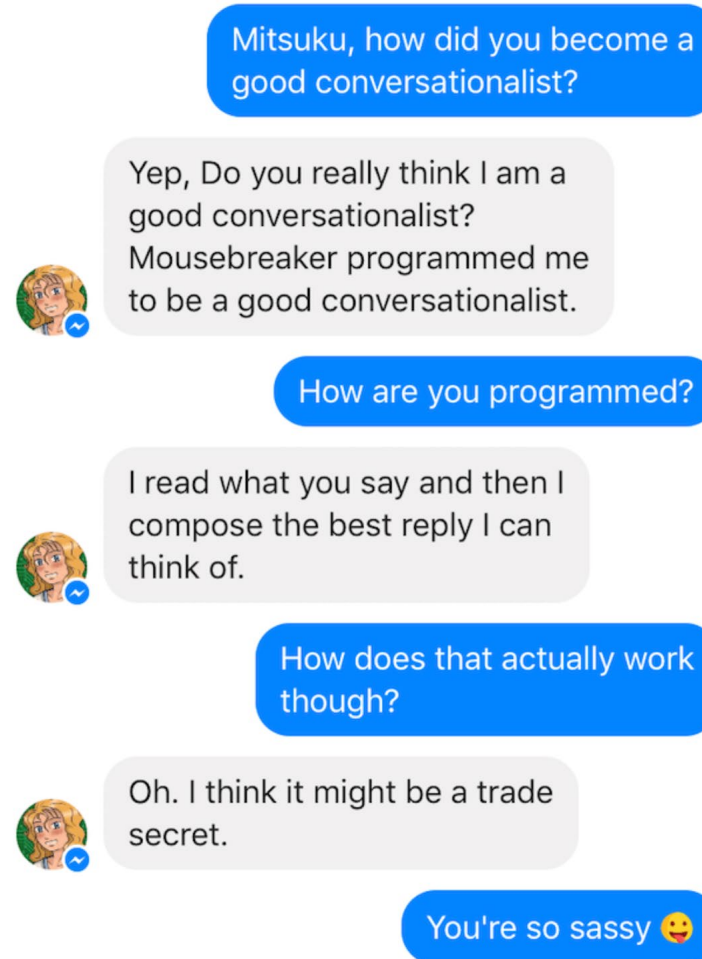


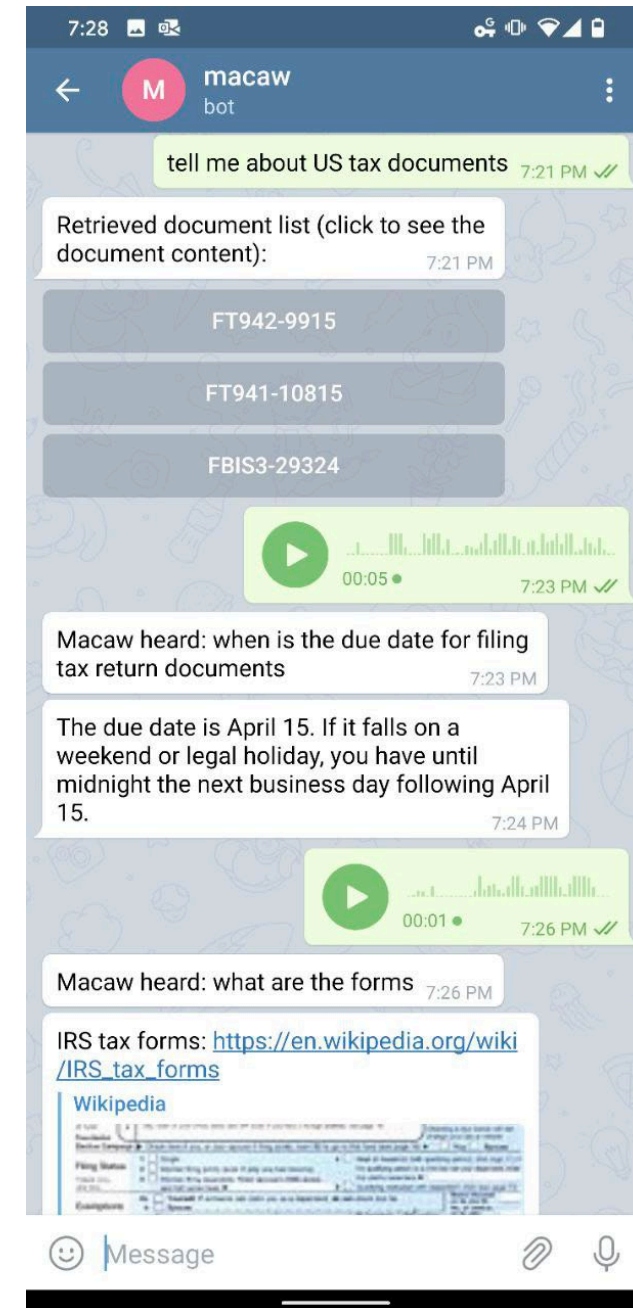
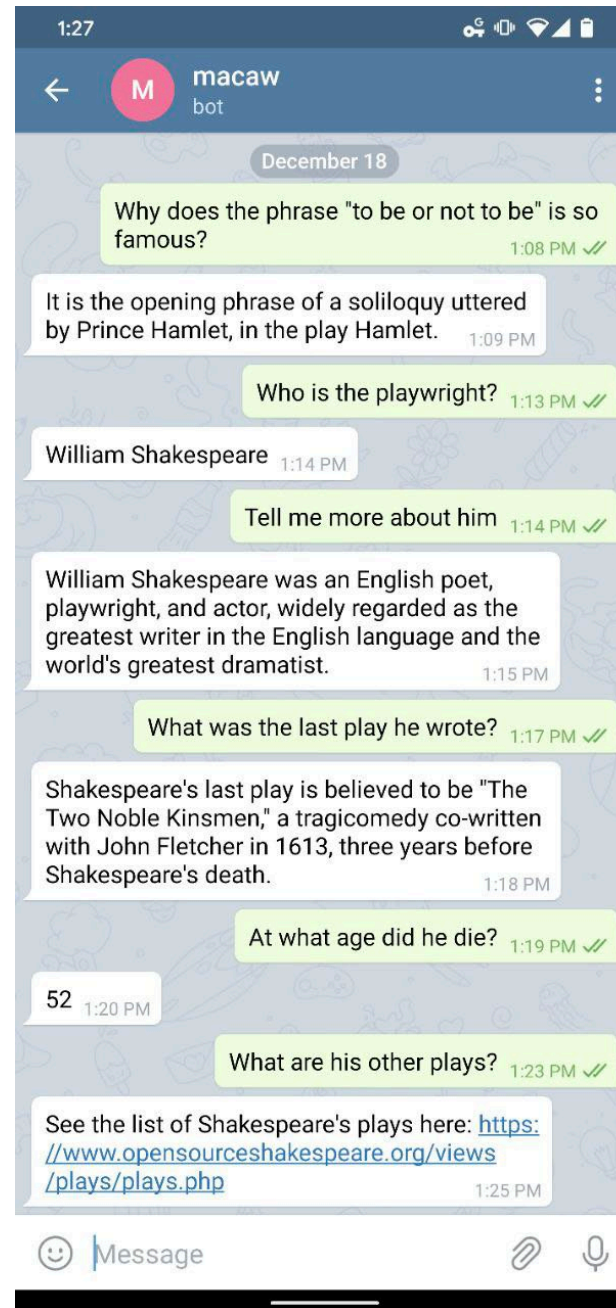
Information access is an important service.

What is conversational information seeking?



Is This Conversational Search?





Existing Definitions of Conversation

- oral exchange of sentiments, observations, opinions, or ideas
 - The Merriam-Webster Dictionary
- a joint activity in which two or more participants use linguistic forms and nonverbal signals to communicate interactively
 - From “Conversation and dialogue” by Brennan (2012)
- researchers in dialogue systems consider a more pragmatic definition by identifying a few attributes in human conversations. These attributes include turn, speech acts, grounding, dialogue structure, initiative, inference, and implicature [Jurajsky and Martin, 2021].

Definition 1. Conversation

Conversation is **interactive communication** for **exchanging information** between two or more participants (i.e., humans or machines) that involves **a sequence of interactions**. While **natural language** is considered as prerequisite for conversational interactions, conversations can also exhibit **other types of interaction with different characteristics and modalities** (e.g., click, touch, and gestures).

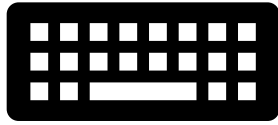
A conversation can be either synchronous, asynchronous, or a combination of both.

Definition 2. Information Seeking Conversation

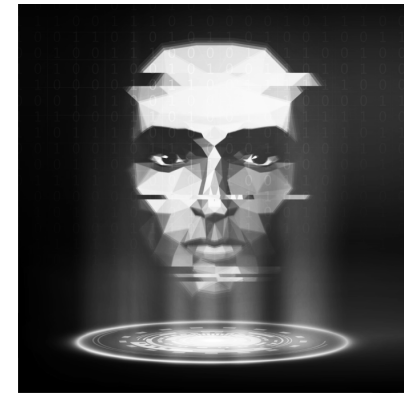
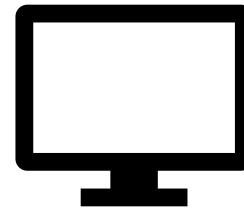
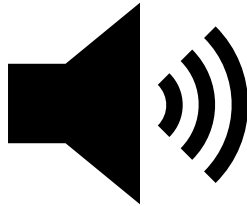
Information seeking conversation is a **conversation (cf. Def. 1)** in which the goal of information exchange is **satisfying the information needs of one or more participants**.

Interaction Modality

Input Modalities



Output Modalities



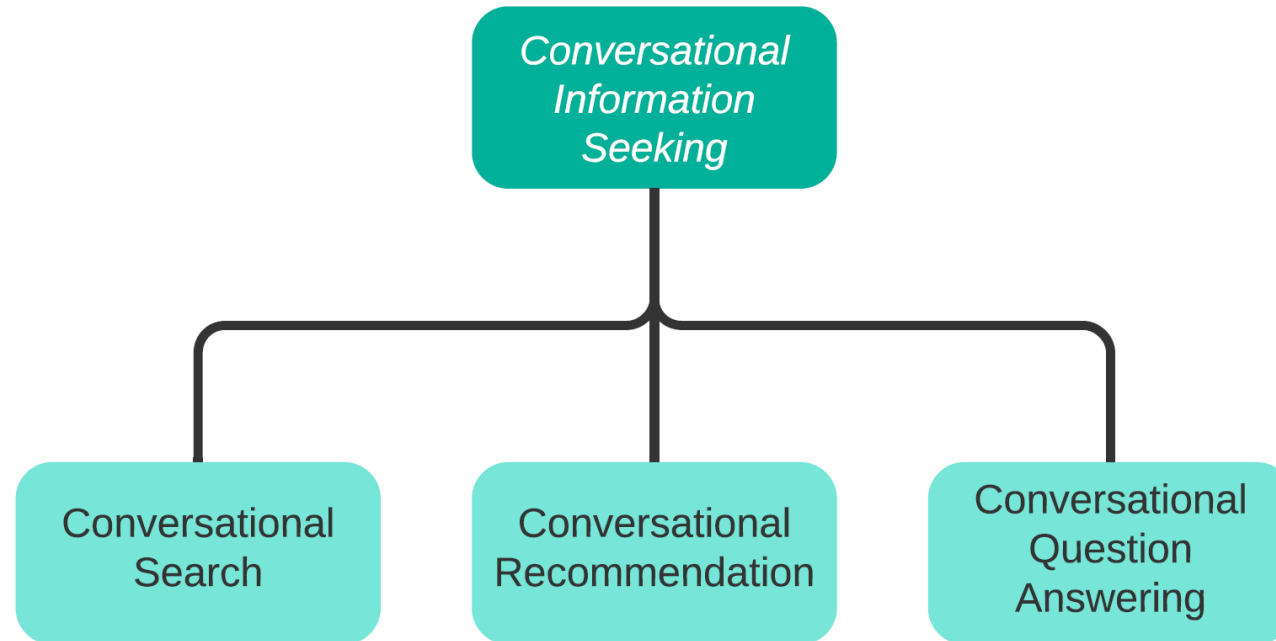
System Requirements of CIS Systems

- the system should be **stateful** and handle **multi-turn interactions**
- the system should present the results **concisely and fluently with a high comprehensibility** to cognitively engage users.
- the system should **pro-actively participate** in the conversation through **mixed-initiative interactions**.
- The interaction history as well as user-specific and contextual information can be adopted to provide **personalized and context-aware access to information**.

Definition 3. Conversational Information Seeking System

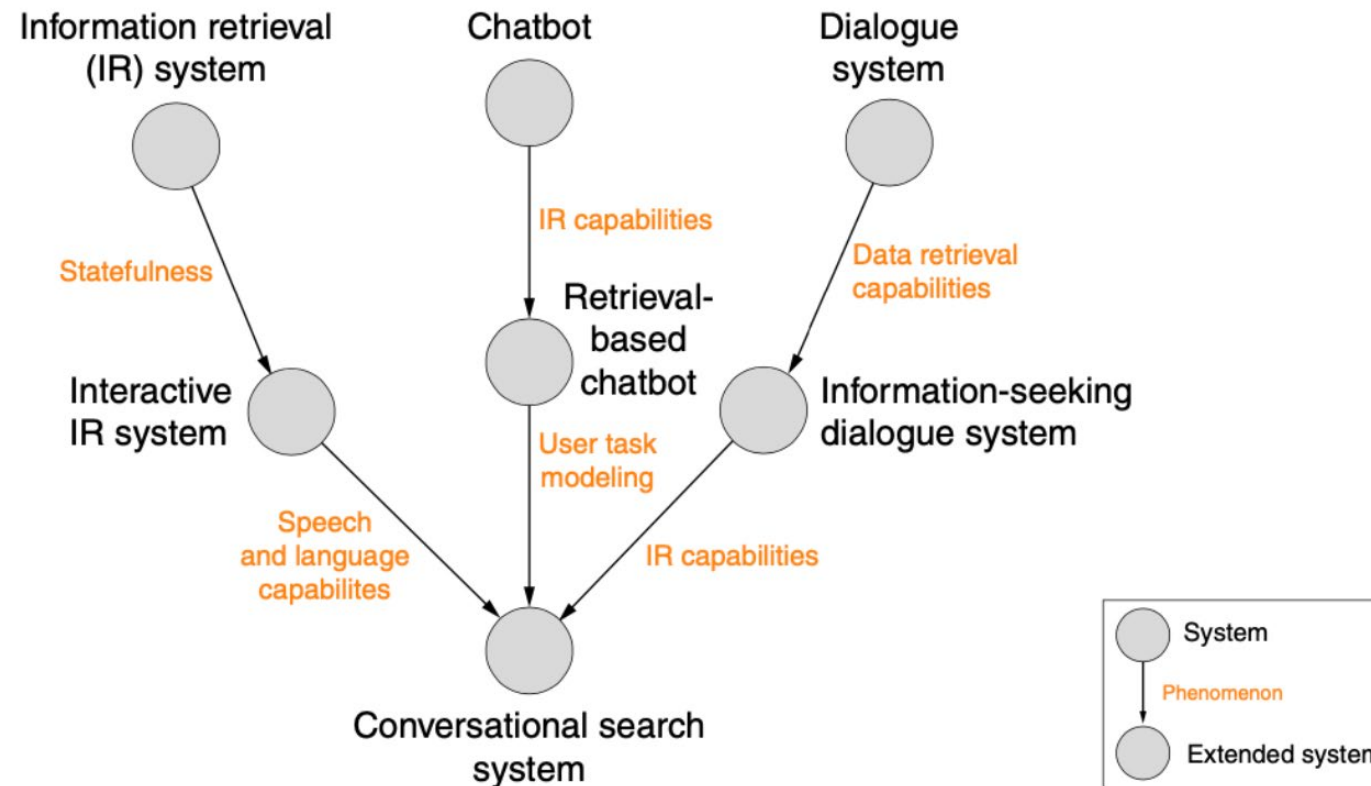
A *Conversational Information Seeking (CIS) system* is a system that satisfies the information needs of one or more users by engaging in **information seeking conversations (cf. Def. 2)**. CIS responses are expected to be **concise**, **fluent**, **stateful**, **mixed-initiative**, **context-aware**, and **personalized**.

CIS Subdomains



Conversational Search

from Dagstuhl Seminar on Conversational Search



Conversational Search

An Example from TREC CAsT Track

| Title: Steroid use in US sports | |
|--|--|
| Description: The history of steroid use in US sports. | |
| Turn | Conversation Utterances |
| 1 | What's the history of steroid use in sports in the US? |
| 2 | What were Ziegler's improvements? |
| 3 | Why are they banned? |
| 4 | Are there visible signs? |
| 5 | That sounds easy to spot. How do they get away with it? |
| 6 | What is the NFL policy? |
| 7 | Isn't that speed? |
| 8 | What is the difference between the two policies? |
| 9 | I heard it even affects card players. Didn't bridge also have a problem? |
| 10 | I know what bridge is. I heard there was a drug scandal recently. |
| 11 | Does the article have more about it? |

Conversational Question Answering

q₁: When was Avengers: Endgame released in Germany?

ans₁: 24 April 2019

q₂ : What was the next from Marvel?

ans₂: Spider-Man: Far from Home

q₃ : Released on?

ans₃: 04 July 2019

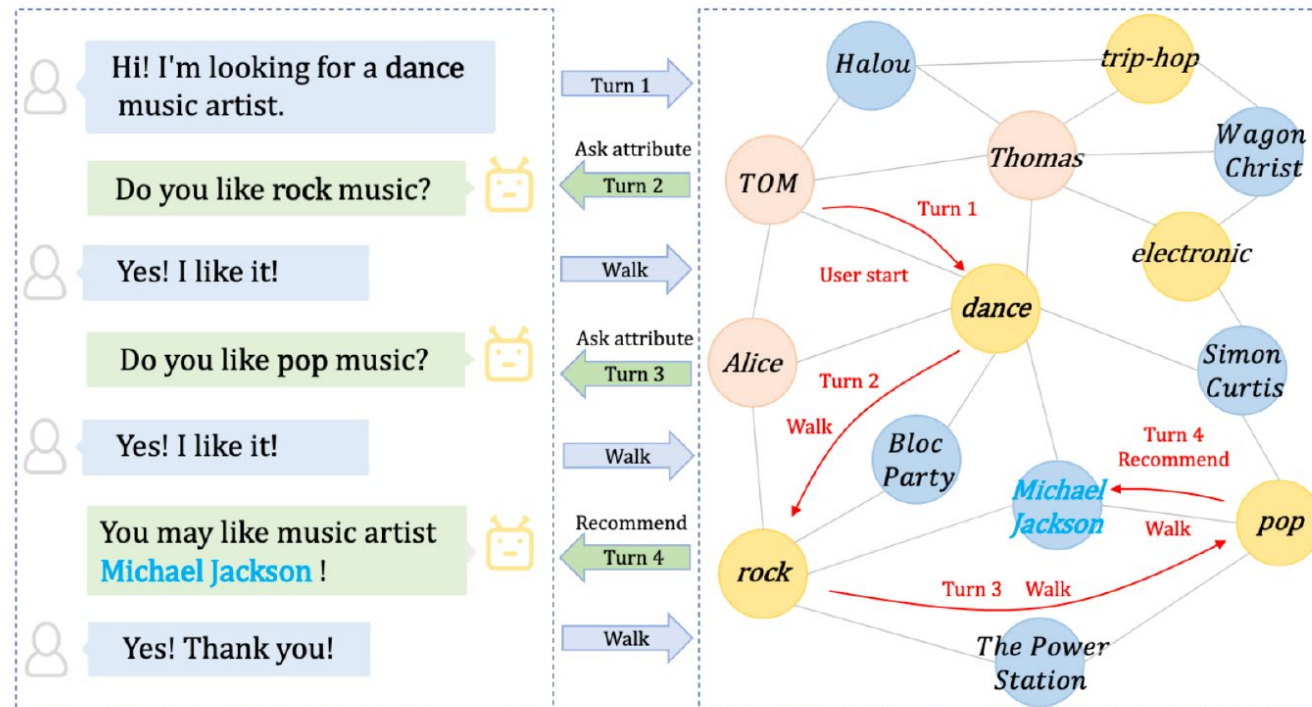
q₄: So who was Spidey?

ans₄: Tom Holland

q₅ : And his girlfriend was played by?

ans₅: Zendaya Coleman

Conversational Recommendation



Questions



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