

Conversational Information Seeking: Theory and Application



#TheCISTutorial

Part 8: Open Assistant Toolkit (OAT) & TaskMAD -
A framework for task-oriented conversational research



UoG GRILLBot

Winner of 2021-22 Alexa Prize Taskbot Challenge

https://grilllab.ai/2022-05-15-alexaprize_taskbot_win/



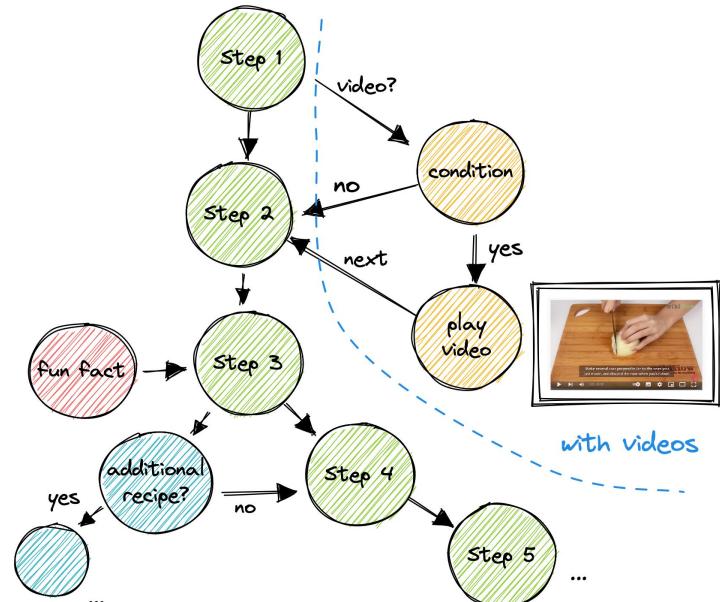
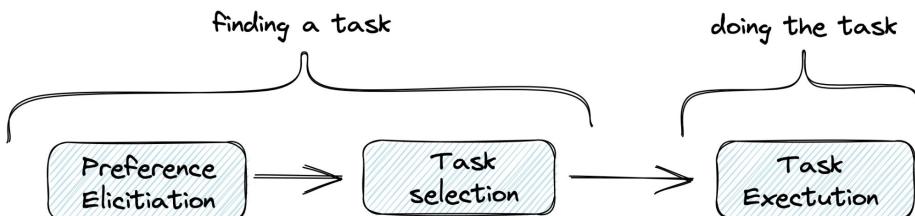
2



OAT - Open Assistant Toolkit

What? A domain-agnostic framework for conversational system research

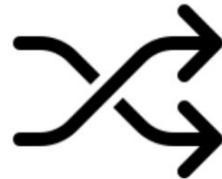
Who? Allows researchers to easily develop and evaluate conversational systems



OAT task walkthrough

Key Features of OAT

Flexible



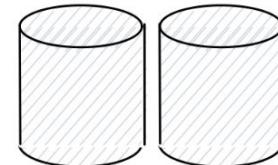
adaptable policies &
architecture

Multimodal



supporting
images & videos

Open



released models &
data sources

Toolkit



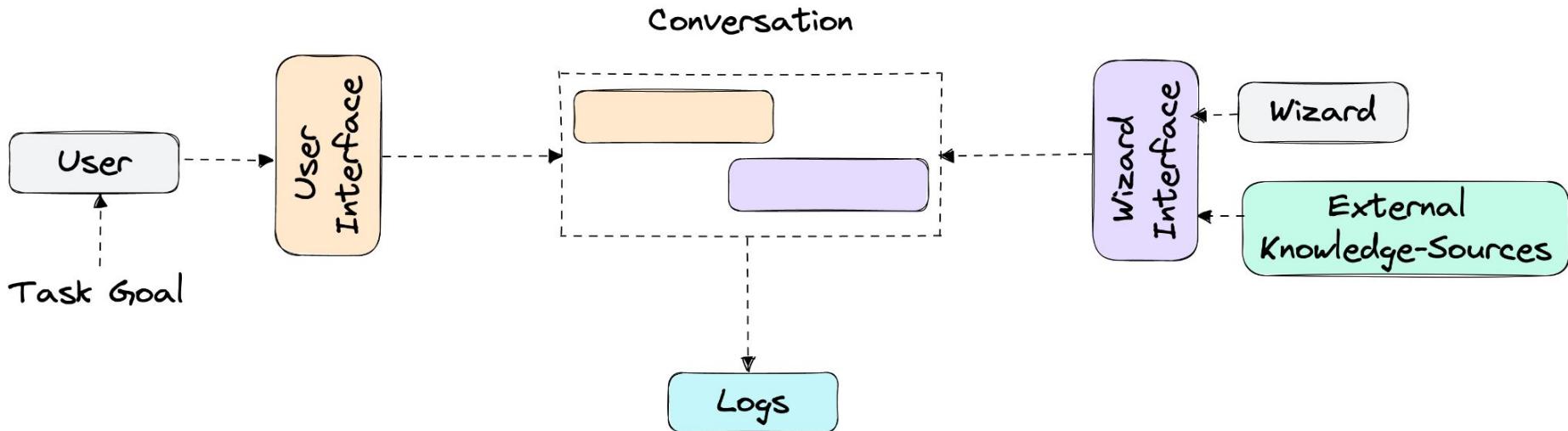
cloud deployment &
inspection tools

How do we collect ConvQA data?

- Lessons learned from Alexa Prize TaskBot Challenge:
 - Need data for training models and evaluation
- **SOLUTION:** We collected data by conducting **Wizard-of-Oz experiments with TaskMAD**

What is TaskMAD?

- TaskMAD is a platform that leverages Wizard-of-Oz for collecting task-specific and domain-focused conversational datasets



Chat Interface: Contextual Information



TASKMAD

The Best Buttermilk-Brined Southern Fried Chicken Recipe

Time, Equipment & Ingredients

- Preparation Time: 45 minutes
- Cooking Time: 300 minutes
- Total Time: 345 minutes
- Wok or chicken fryer
- 2 tablespoons paprika
- 2 tablespoons freshly ground black pepper
- 2 teaspoons garlic powder
- 2 teaspoons dried oregano
- 1/2 teaspoon cayenne pepper
- 1 cup buttermilk
- 1 large egg
- Kosher salt
- One whole chicken, about 4 pounds, cut into 10 pieces or 3 1/2 pounds bone-in, skin-on breasts, legs, drumsticks, and/or wings
- 1 1/2 cups all purpose flour
- 1/2 cup cornstarch
- 1 teaspoon baking powder
- 4 cups vegetable shortening or peanut oil

Contextual & Task Specific Information

hi

agent: Hey there! Happy to have you on board for our masterclass :-) Today you will be learning how to prepare the Best Southern Fried Chicken. Make sure you have all the ingredients and tools and feel free to ask questions. If you are ready to start cooking simply say next.

next

agent: Before proceeding further, do you have any questions about this step?

Why is the cooking time so long?

agent: It takes 345 minutes to fully prepare the fried chicken. This is because you need to first prepare the mixture and then fry it.

and if i don't have shortening or peanut oil can i use canola oil?

agent: Peanut and canola are vegetable oils. Oils labelled vegetable oil are blends and can be any proportion of things like canola (rapeseed), peanut, corn, sunflower, etc. Different vegetable oils will give different properties although most will give you about the same result. Canola is flavorless and relatively light while peanut is a bit richer and, well, peanut-y. The differences will be subtle.

oh okay, thank you for that information

agent: You are welcome! Do you have any other questions or would you

↑

Chat Interface: Chat Transcript



TASKMAD

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Chat Transcript & Input



agent: Hey there! Happy to have you on board for our masterclass :-) Today you will be learning how to prepare the Best Southern Fried Chicken. Make sure you have all the ingredients and tools and feel free to ask questions. If you are ready to start cooking simply say next.

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Wizard Interface Demo



What data do we get?

user: What is the origin of Pecorino Fiore Sardo?

Pecorino sardo, also known as fiore sardo, is a firm cheese from the Italian island of Sardinia which is made from sheep milk.

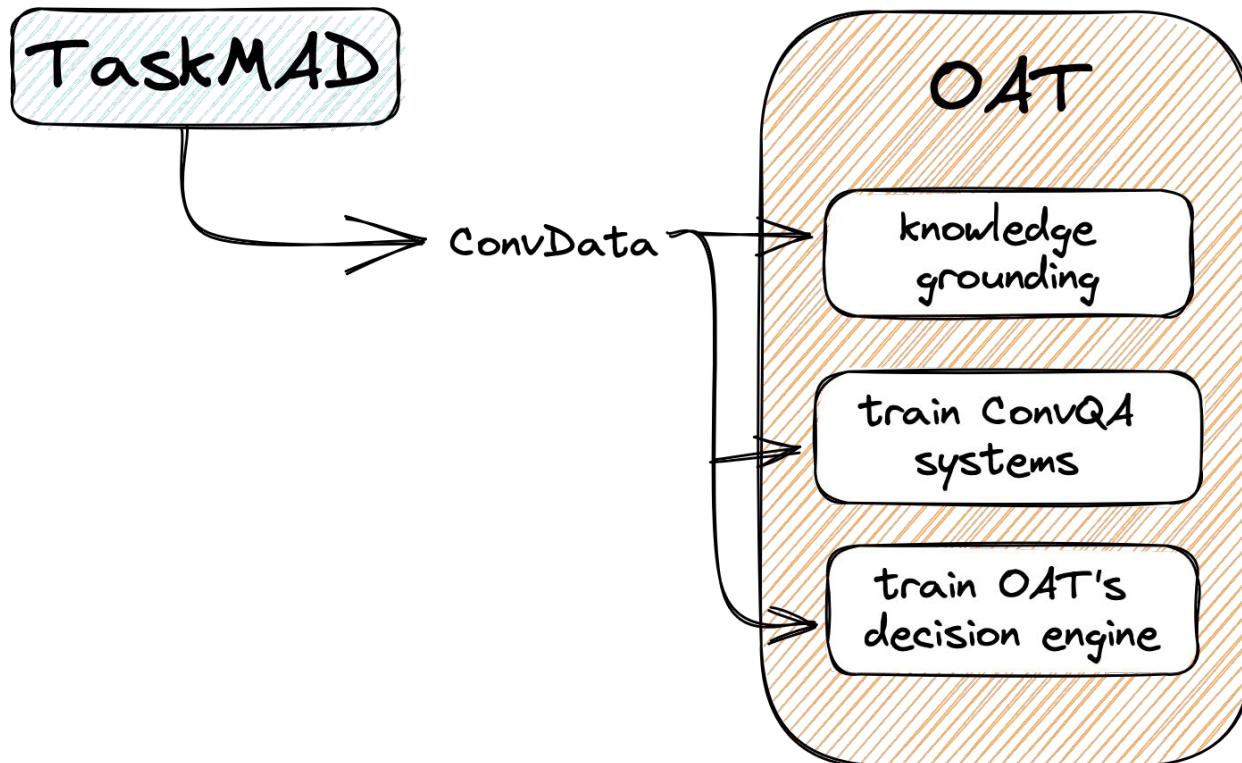
Generated Metadata

```
{  
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    "interaction_type": 1,  
    "logged_page_ids": ["52c8752b1b04b2fd"],  
    "logged_page_origins": ["wikipedia"],  
    "logged_paragraph_ids": ["682a65ced15df438"],  
    "logged_paragraph_texts": [  
        "Pecorino sardo...specifically from the milk of the local Sardinian breed..."  
    ],  
    "logged_paragraph_timestamp": [1657478062537],  
    "logged_search_queries": ["pecorino fiore sardo"],  
    "logged_search_queries_timestamp": [1657478019633],  
    "user_id": "agent"  
}
```

How can you use TaskMAD?

- Github: <https://github.com/grill-lab/TaskMAD>
- Live system:
 - Chat Interface: <https://woz-uog.online>
 - Wizard Interface: <https://woz-uog.online>
 - Guidelines: www.shorturl.at/cfjVW

How can we use this data in practice?

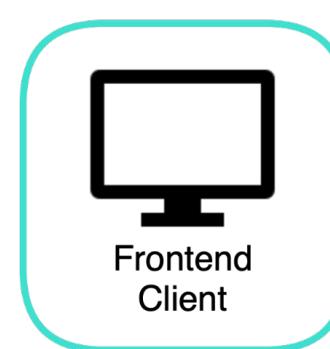
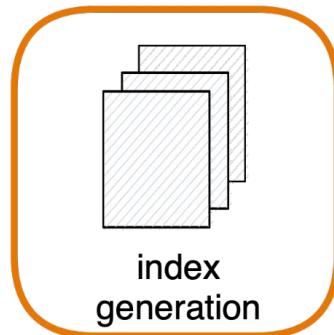


Hands-On Tasks Overview

Prep



Tasks



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Getting your hands in OAT(s)

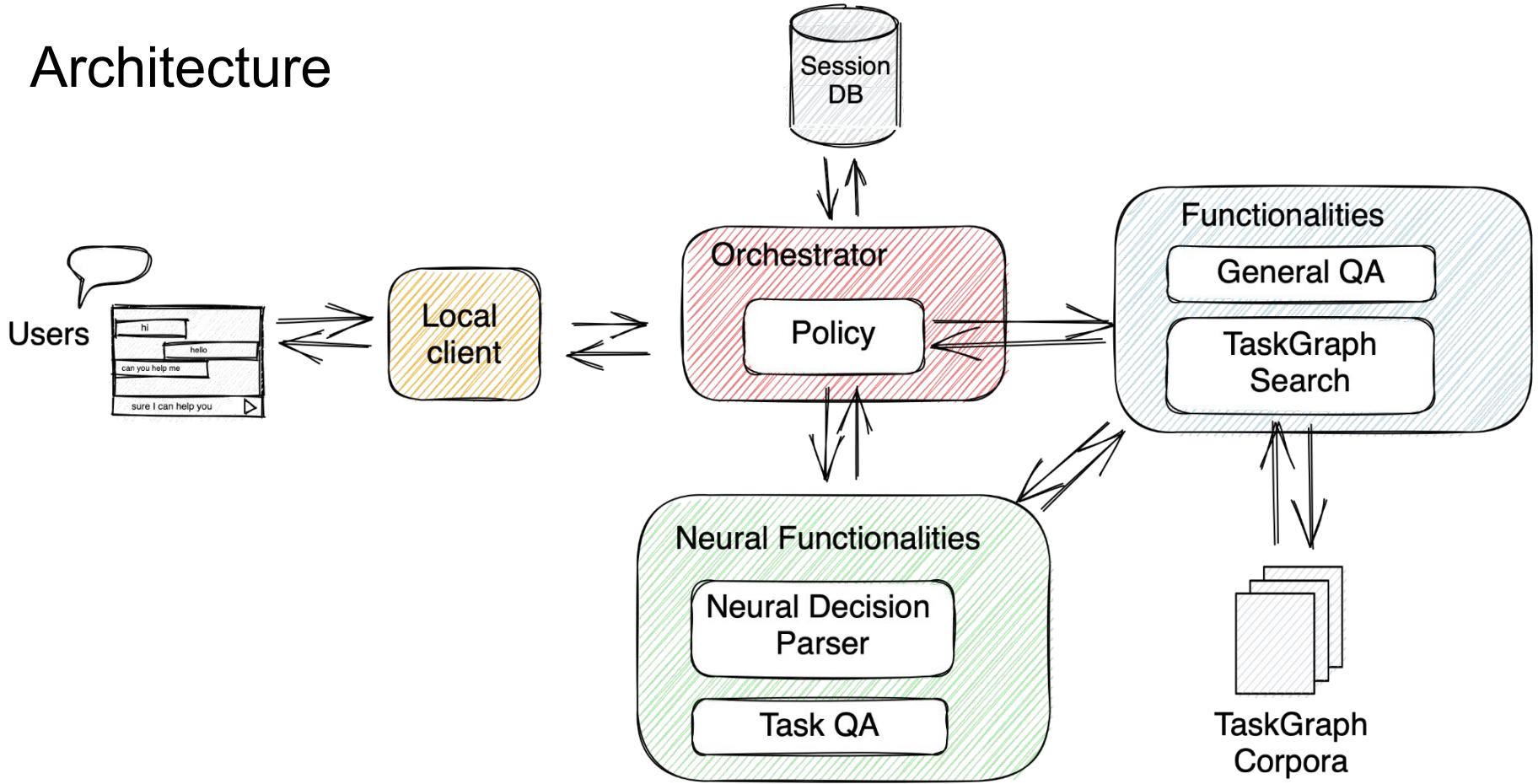


Running the system

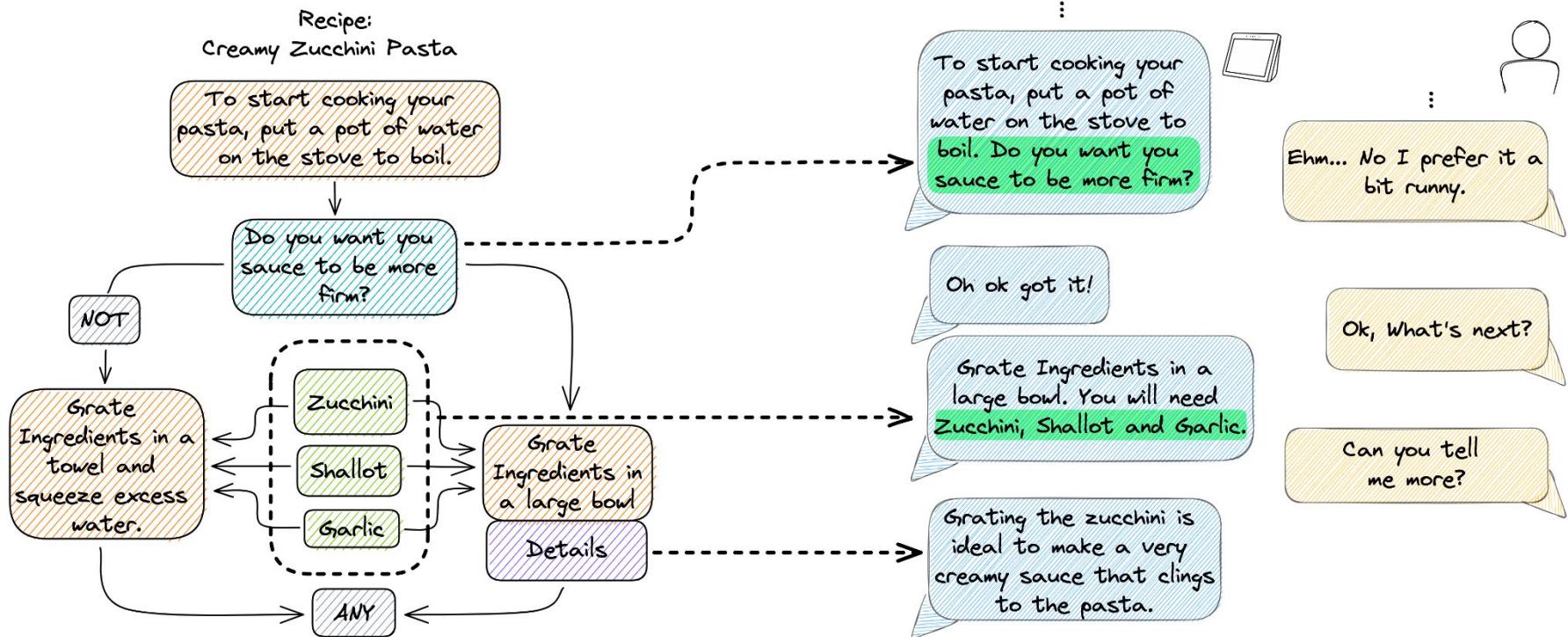
- Confirm docker containers are running correctly →

```
InternalGRILL — docker-compose - docker compose up --build — 92x39
Downloading: 100%|██████████| 605/605 [00:00<00:00, 1.13MB/s]
Downloading: 100%|██████████| 294M/294M [03:08<00:00, 1.63MB/s]
Downloading: 100%|██████████| 2.02k/2.02k [00:00<00:00, 2.66MB/s]
Downloading: 100%|██████████| 773k/773k [00:01<00:00, 545kB/s]
Downloading: 100%|██████████| 1.74k/1.74k [00:00<00:00, 2.29MB/s]
Downloading: 100%|██████████| 605/605 [00:00<00:00, 1.03MB/s]
neural_functionalities | [2022-07-06 14:01:39,282] - INFO - local.neural_functionalities
- __init__:29 - Loaded General QA model
neural_functionalities | [2022-07-06 14:01:39,290] - INFO - local.neural_functionalities
- __init__:52 - loading and computing intent embeddings
Batches: 100%|██████████| 10/10 [00:01<00:00, 8.38it/s]
neural_functionalities | [2022-07-06 14:01:49,912] - INFO - local.neural_functionalities
- __init__:65 - loading RnD intent classifier
Downloading: 100%|██████████| 25.0/25.0 [00:00<00:00, 11.8kB/s]
Downloading: 100%|██████████| 1.21k/1.21k [00:00<00:00, 1.75MB/s]
Downloading: 100%|██████████| 773k/773k [00:01<00:00, 401kB/s]
Downloading: 100%|██████████| 1.74k/1.74k [00:00<00:00, 1.90MB/s]
neural_functionalities | [2022-07-06 14:03:45,804] - INFO - local.neural_functionalities
- __init__:72 - loading question type classifier
neural_functionalities | [2022-07-06 14:04:00,206] - INFO - local.neural_functionalities
- __init__:79 - Loaded RnD UnifiedQA intent parsing model from: /shared/file_system/models/policy_classification/UQA_intent_model_1185
neural_functionalities | [2022-07-06 14:04:00,209] - INFO - local.neural_functionalities
- __init__:18 - loading sBERT model
neural_functionalities | [2022-07-06 14:04:15,112] - INFO - local.neural_functionalities
- __init__:20 - loading sBERT tokenizer
neural_functionalities | [2022-07-06 14:04:19,410] - INFO - local.neural_functionalities
- __init__:23 - sBERT is Loaded!!!
neural_functionalities | [2022-07-06 14:04:26,441] - INFO - local.neural_functionalities
- __generate_embeddings:35 - Computing query embeddings for Themes...
external_functionalities | [2022-07-06 14:04:26,477] - INFO - local.external_functionalities
- wrapper:27 - TIMEIT: scan_ids took 0.0000 s
neural_functionalities | [2022-07-06 14:04:26,640] - INFO - local.neural_functionalities
- __generate_embeddings:39 - No Theme Queries
neural_functionalities | [2022-07-06 14:04:33,677] - INFO - local.neural_functionalities
- __init__:25 - computing video embeddings
Batches: 100%|██████████| 23/23 [00:02<00:00, 8.27it/s]
neural_functionalities | [2022-07-06 14:04:56,385] - INFO - local.neural_functionalities
- serve:68 - Finished loading all models
```

Architecture

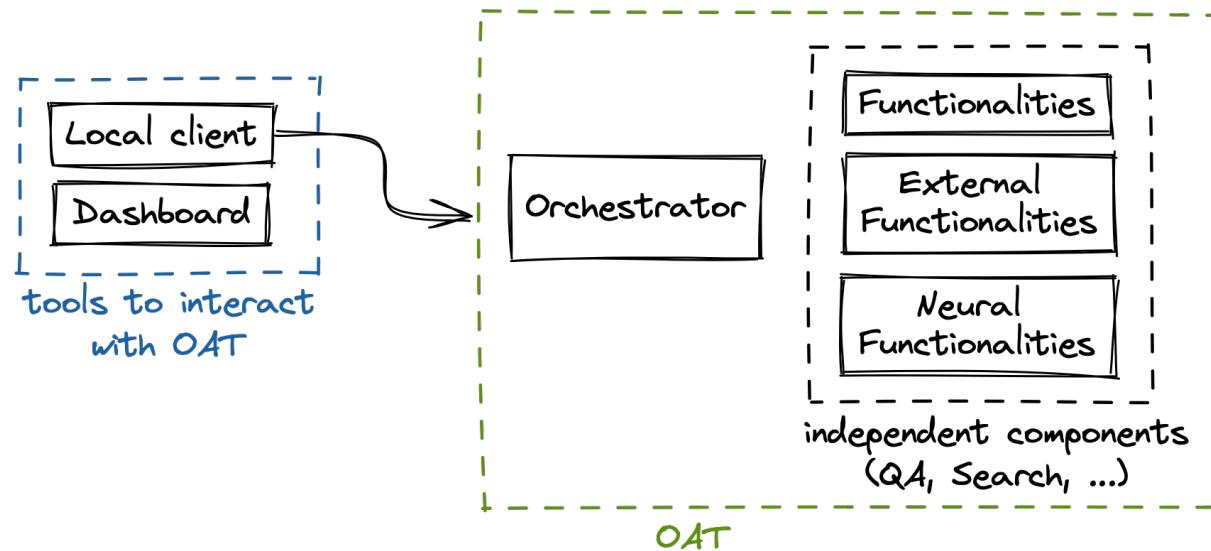


Task Graphs: a live example



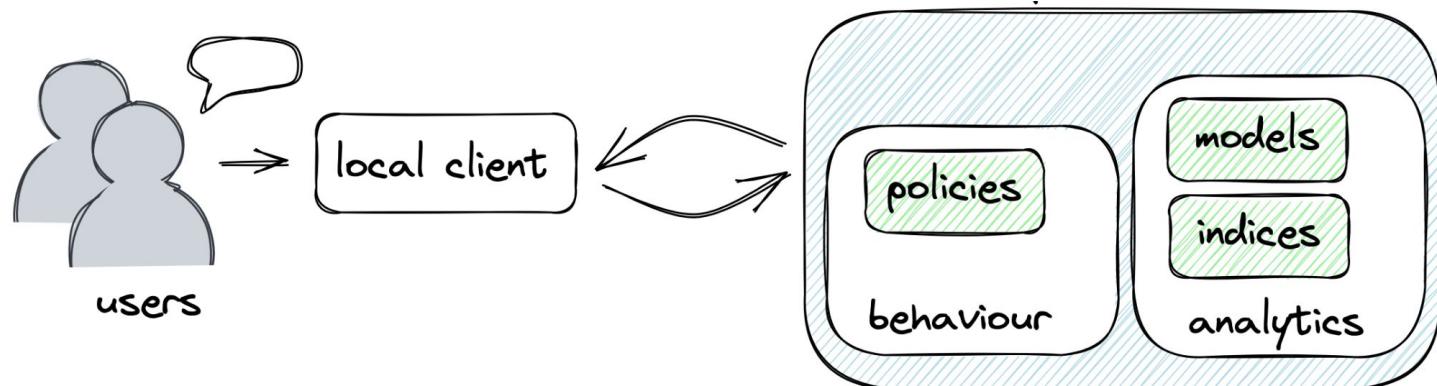
Task 0 - Running the system

- Microservice architecture:
 - *Local client*
 - *Orchestrator*
 - *Functionalities*
 - *External functionalities*
 - *Neural functionalities*



Local Client

- This is a conversational interface that interacts with OAT
- Researchers can replace with any front-end client



Open <http://127.0.0.1:9000/> in your browser

Local Client

Open Assistant Toolkit Dev. Chat

Baking With Dorie
Ann Brettingen's Swedish Apple Cake Recipe by Dorie Greenspan
Which would you like?

User: cancel

BOT: I can help with cooking and home improvement
What would you like to make?

User: pizza bufalina

BOT: So, for "pizza bufalina", I found three great matches
First is
Outdoor Pizza Oven 'Nduja Pizza by Andrew Janjigian
Second is
Pizza With Hot Soppressata, Mozzarella, Chilies, and Honey Recipe by J Kenji López-Alt
And, third
Outdoor Pizza Oven Charred Broccoli Rabe and Anchovy Pizza by Andrew Janjigian
You can also select a result if you'd like
Which would you like?

User: 2

BOT: Here is the summary of the task
Do you want to see the ingredients?

User: show ingredients

BOT: Before we get started, please be careful when using any tools or equipment
Do you want to start?

User: Start

BOT: Got it
So you're aware, you can ask me to repeat, go back, or say the next step
If you'd like, I can also give you more details about a step, or remind you of the things you'll need for this recipe
So, for Step 1 out of 7
Divide dough into four equal parts and place each in a covered quart-sized deli container or a zipper-lock freezer bag
Allow to rest at room temperature for at least 2 hours before baking
Transfer tomatoes to a medium bowl and roughly crush by hand
Season to taste with salt and set aside.

User: How much flour do I need?

BOT: Great question! I don't know the answer but I don't want that to slow us down
I'm really keen to keep going!

User: next step

BOT: Step 2

Adjust oven rack to 6 inches under broiler and place stone or steel on rack
Preheat oven to highest possible temperature (500 or 550°F) for at least 45 minutes
Alternatively, use a KettlePizza and Baking Steel grill insert.

Say something nice Send

I understood: "next step"

Step 2

Adjust oven rack to 6 inches under broiler and place stone or steel on rack. Preheat oven to highest possible temperature (500 or 550°F) for at least 45 minutes.
Alternatively, use a KettlePizza and Baking Steel grill insert.

Requirements:

- baking stone or Baking Steel (see note)

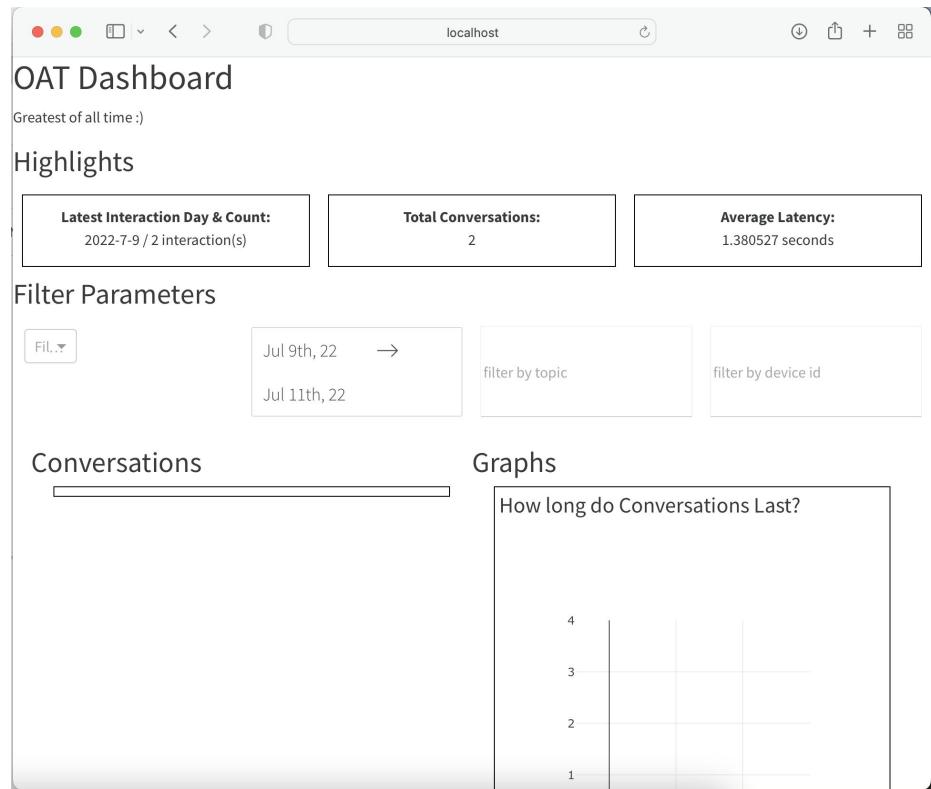
Hint: Say "Hint: Ask about specific ingredients"

[Previous](#) [Next](#)

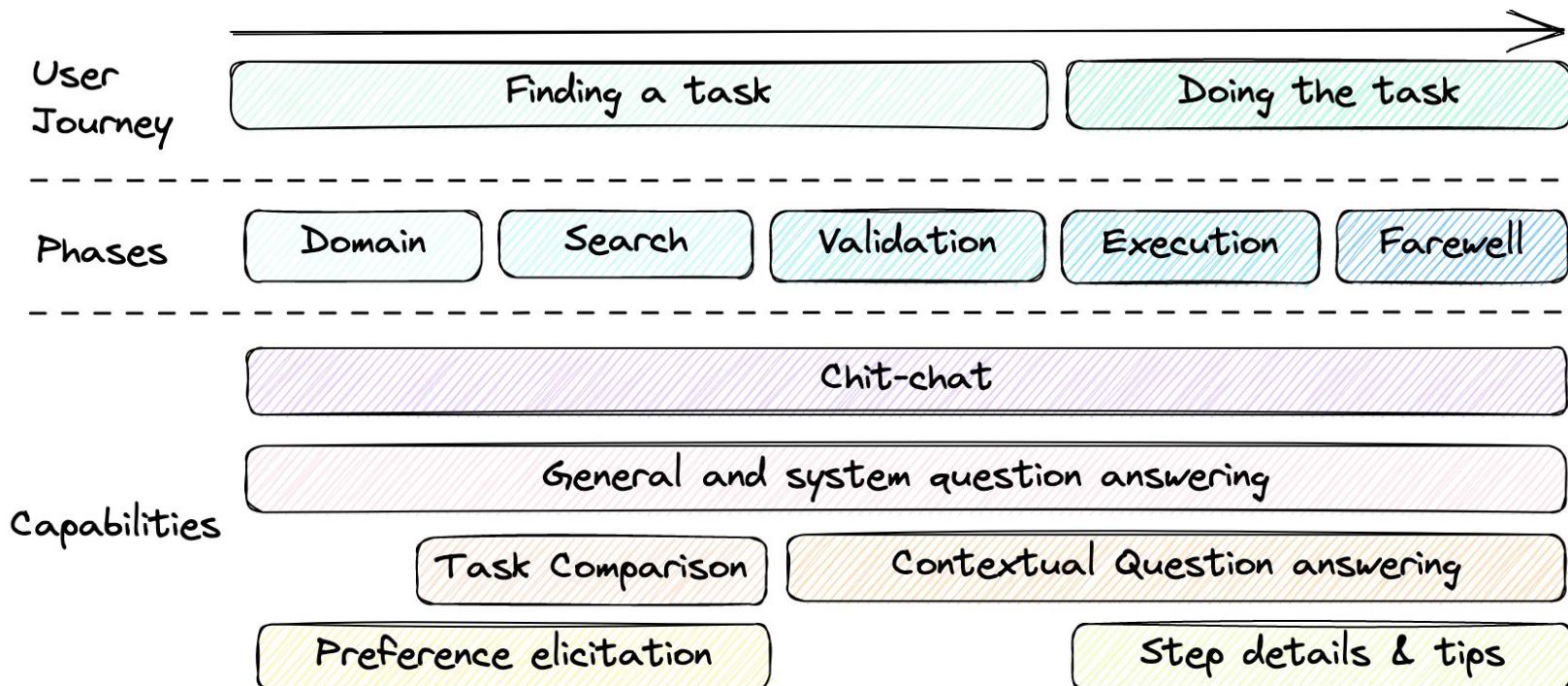


Dashboard

- Analyse conversation history using the dashboard
- Build dashboard docker container
 - ***Open new terminal*
 - *> docker compose build dashboard*
- Go to <http://localhost:7500>



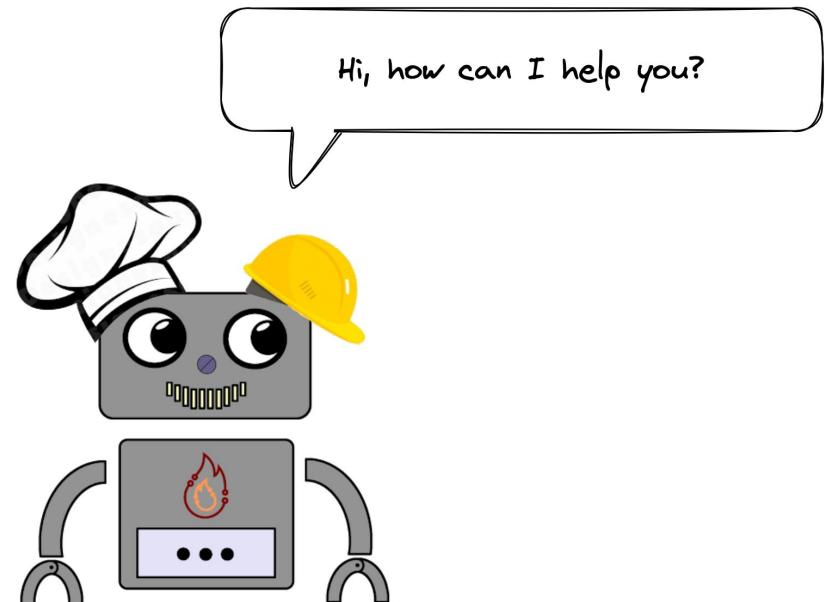
Conversation flow: A phased approach



Task 1 - Prompt Changes

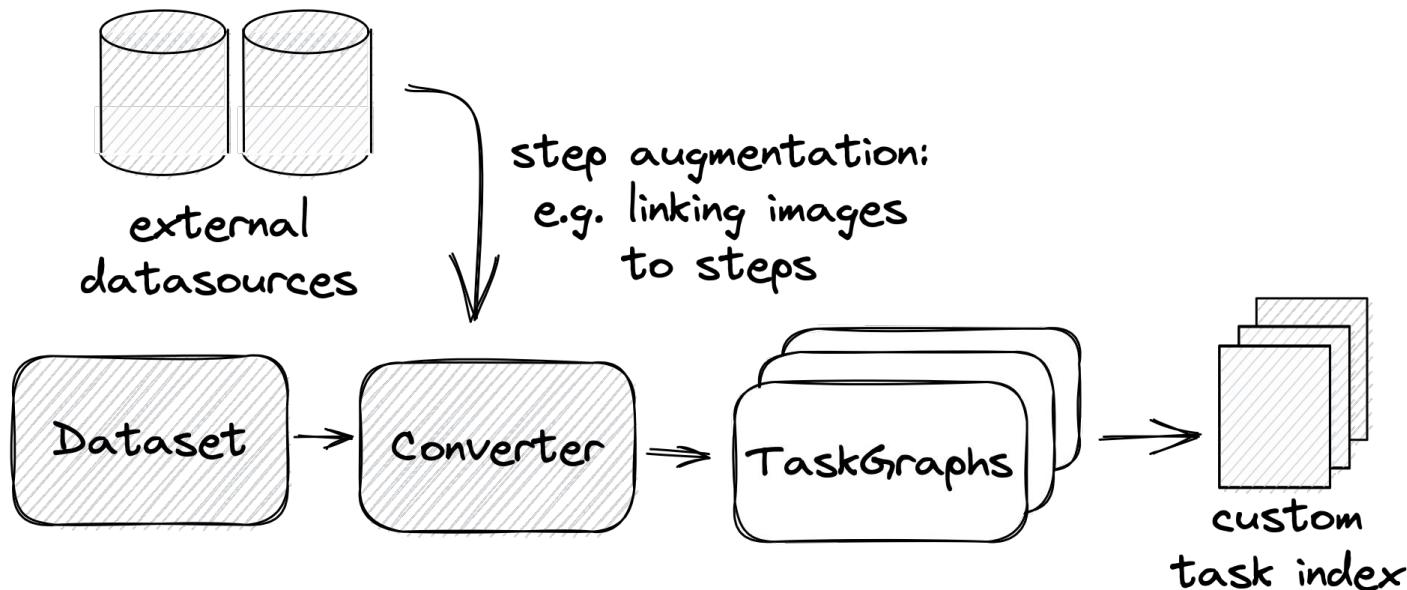
Defining the agent's personality

- Prompt definitions split into conversation phases:
shared/utils/constants/prompts.py
- Your Task: Change greeting to be funny, add a joke, system capabilities
...



Task 2 - Index Generation

- Generating a TaskGraph index from downloaded custom dataset
- Generation pipeline configurable in taskmap_generation/config.py file: each dataset has its own config



Advanced Tasks



ConvQA
system

Task 3



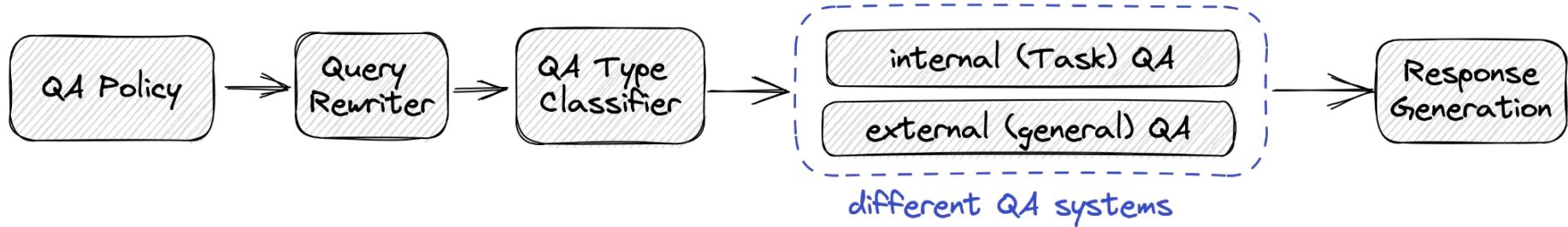
Frontend
Client

Task 4

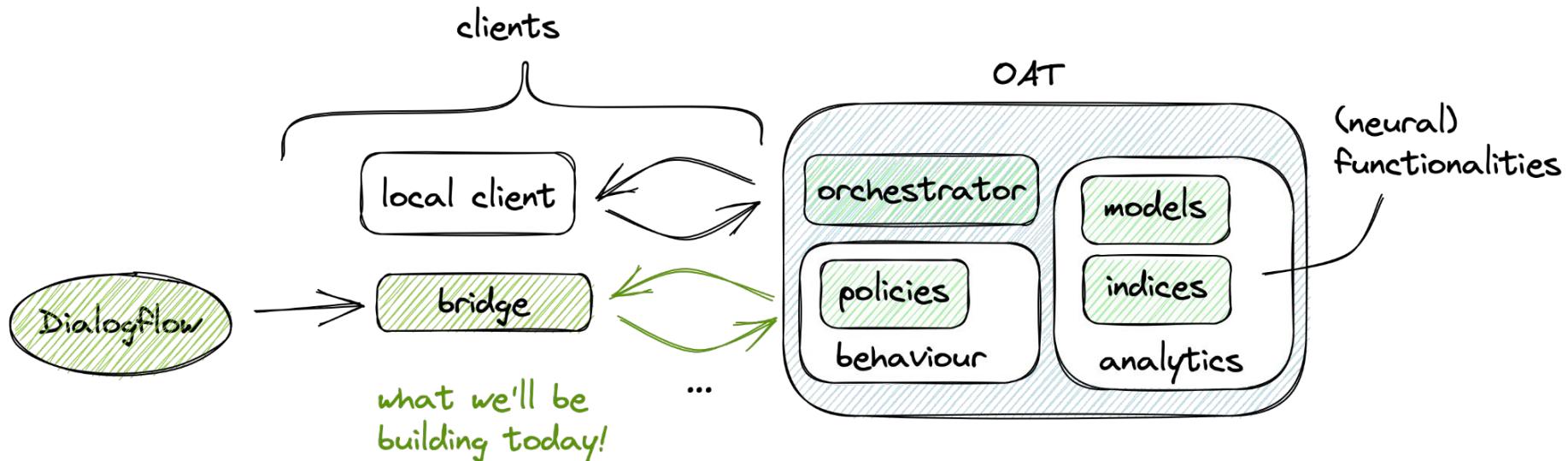
Choose your own adventure!

Task 3 - Link an existing ConvQA system

- Two QA systems provided for OAT
 - External QA: T5 small model trained on natural questions
 - Internal QA: SQuAD model - generate answers about current task
- Both defined as a gRPC microservices



Task 4 - Adding a new front-end client in Google Dialogflow



README guide: <https://github.com/grill-lab/OAT/blob/main/doc/dialogflow.md>

Conclusion

You've been the first people to
use and deploy OAT in the wild.
Thanks for your help!



You are on your way to an
Alexa-prize worthy conversational
agent!

