The SEWASIE system: A multi-agent system for querying heterogeneous data sources with ontologies

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- SEWASIE (SEmantic Web and AgentS in Integrated Economies)

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- started on May 2002, and finished on May 2005

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More info: `www.sewasie.org`

This Talk

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Talk Overview

1. general architecture
2. query tool
3. query process
4. system deployment
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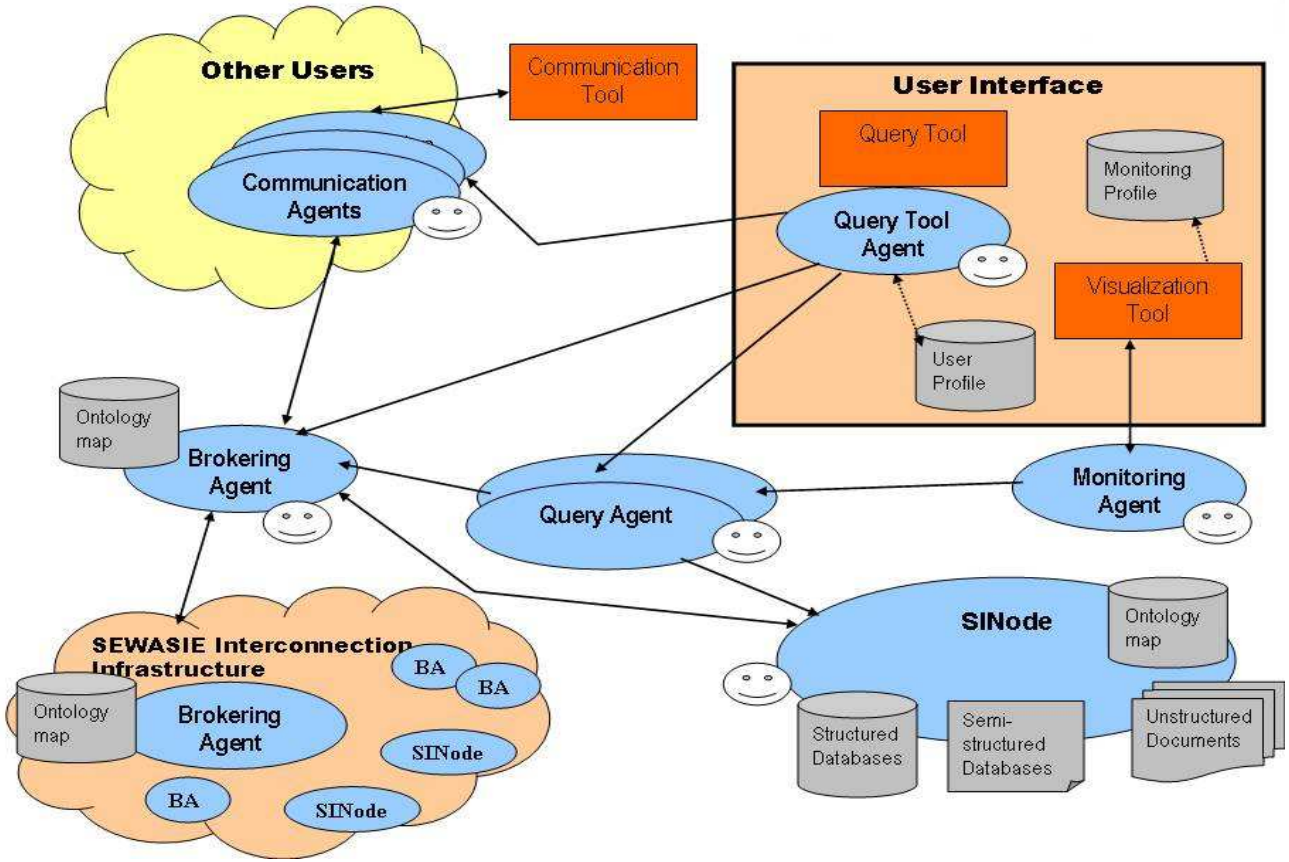
General Architecture



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- extended features: query tool, visualization tool, communication tool

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- an ontology builder component helps in the process of semantic enrichment.

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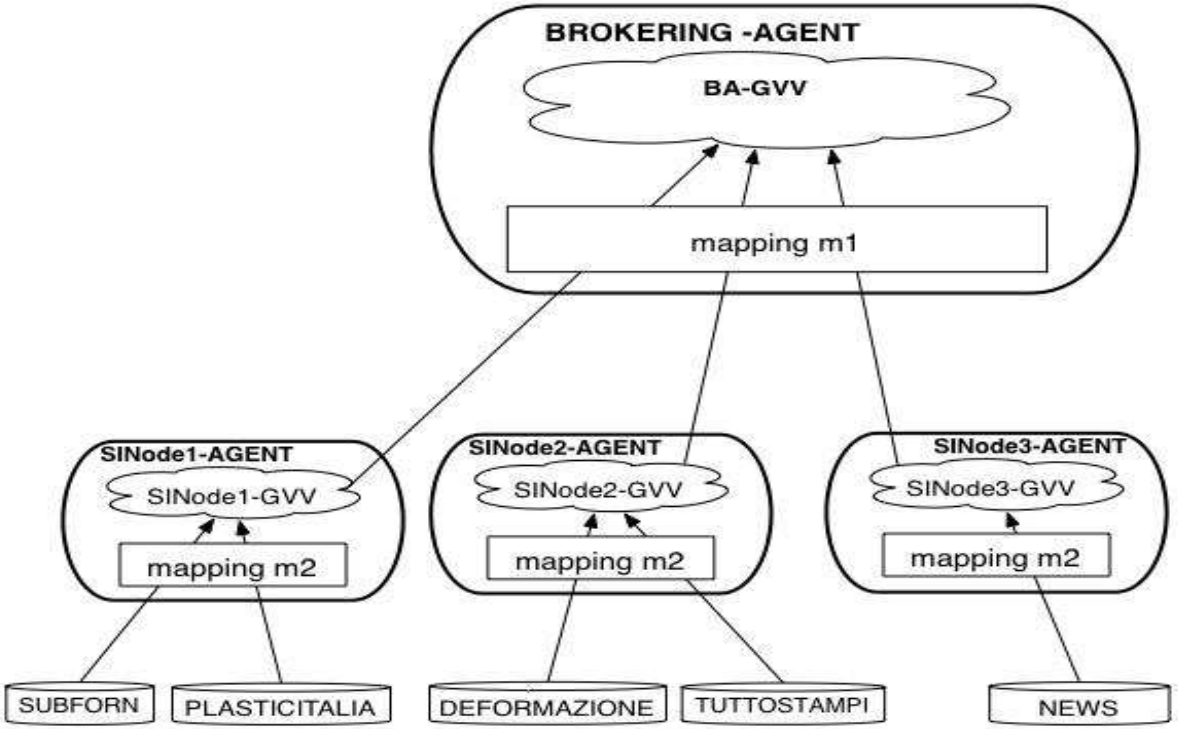
- they are the entry points to the system, routing the queries to relevant information nodes

Example: the mechanical sector BA



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- can be also created by other agents

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- each instance includes a Query Tool Agent that is responsible to carry out communications with other agents
- the final purpose of the tool is to generate a conjunctive query ready to be executed by the evaluation engine associated to the information system

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- this data is later linked to OLAP reports, with the generation of automatic annotations

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- the semi-automatic negotiation is also carried out by agents: Initiation agents, Negotiation agents, Filtering and Ranking agents, and Resource Management agents

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- refinement process: users may specify their requests using generic terms, refine some terms of the query, or introducing new terms; and then iterating the process
- the paradigm is explore and discover information about the domain, by getting an explicit meaning to a query and to its subparts through classification

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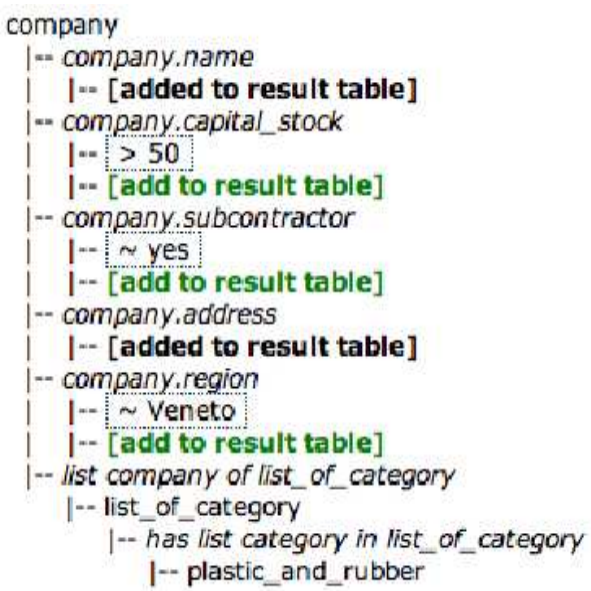
- example: *Give me the subcontracting companies in Veneto with a big capital stock in the plastic and rubber sector*



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- the system allows only the operations which are "compatible" with the focus in the context of the current query expression
- a description logic reasoner is called each time the query expression is modified, in order to get "compatible" expressions

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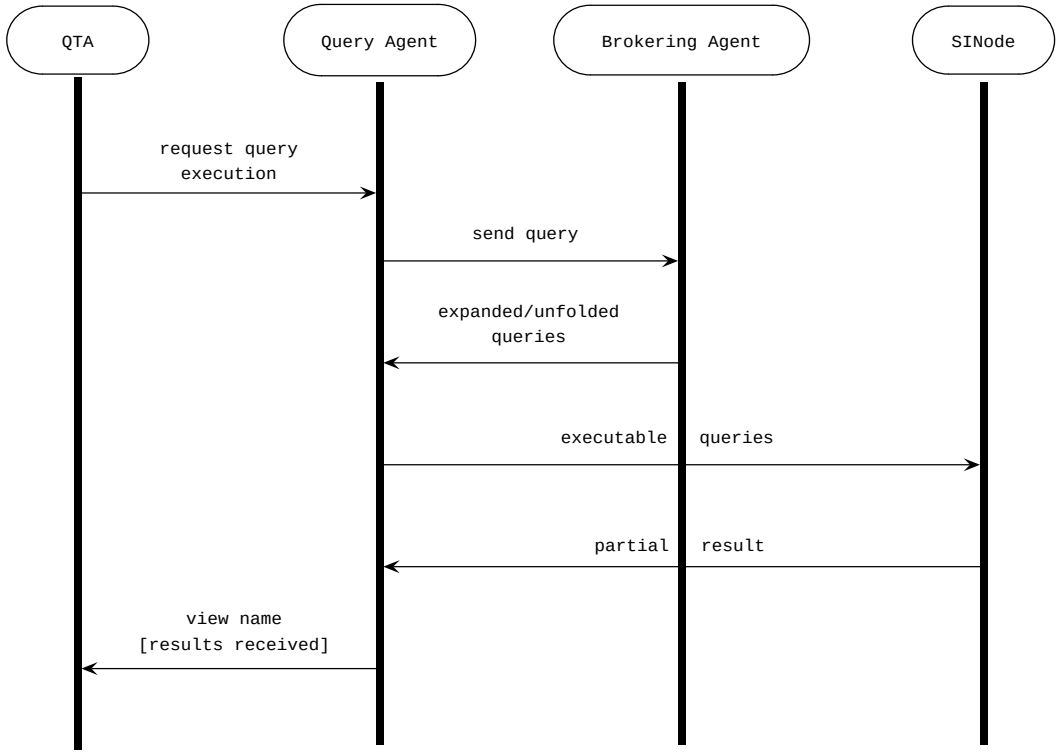
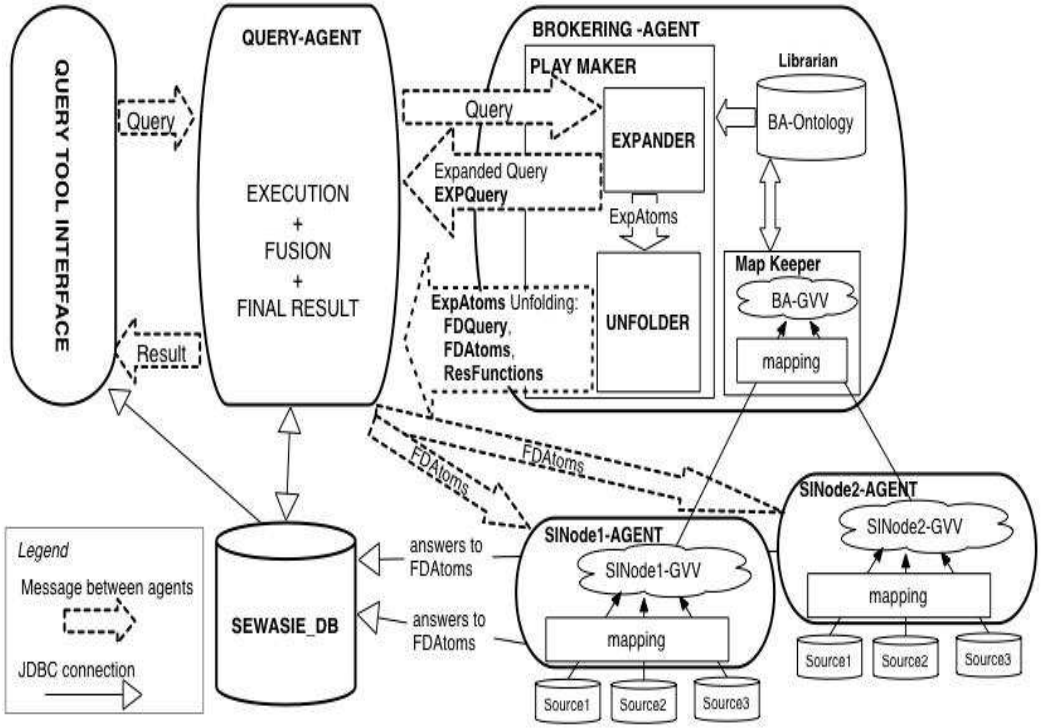
General Description



A More Detailed View



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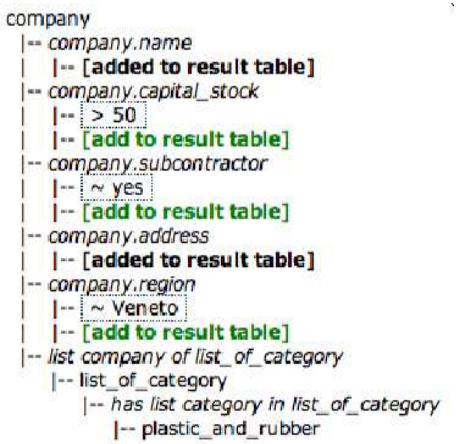
- example:



EXPQuery:
SELECT $r2.NAME, r2.ADDRESS, r2.NATION$
FROM $scq1\ r1, scq2\ r2, scq3\ r3$
WHERE $r1.CATEGORY\_ID = r3.CATEGORY\_ID$
AND $r2.COMPANY\_ID = r3.COMPANY\_ID$
UNION
SELECT $r2.NAME, r2.ADDRESS, r2.NATION$
FROM $scq4\ r1, scq2\ r2, scq3\ r3$
WHERE $\cdots$
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- example:

scq1:
SELECT $CATEGORY\_ID$
FROM $Mould\_Making$
scq2:
SELECT $NAME, COMPANY_ID, CAPITAL_STOCK,$
$REGION, SUBCONTRACTOR, ADDRESS$
FROM $company$
WHERE $CAPITAL\_STOCK > 50$
AND $REGION\ LIKE\ VENETO$ AND $SUBCONTRACTOR\ LIKE\ yes$ scq3:
...

- the output to the QA contains: a SQL query (FDQuery) which computes object fusion, its atoms (FDAtoms) are Single Class Queries over the SINode GVV; the expanded atoms queries; and some residual functions

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- example:

FDQuery:
SELECT $*$
FROM $FDAtom1$ OUTER JOIN $FDAtom2$
ON $(FDAtom1.COMPANY_ID = FDAtom2.COMPANY_ID)$

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- by virtue of the separation between query expansion and query rewriting and evaluation, query processing is polynomial time in data complexity (i.e., with respect to the size of the data at the sources)

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- communication between agents is done following standard FIPA interaction protocols

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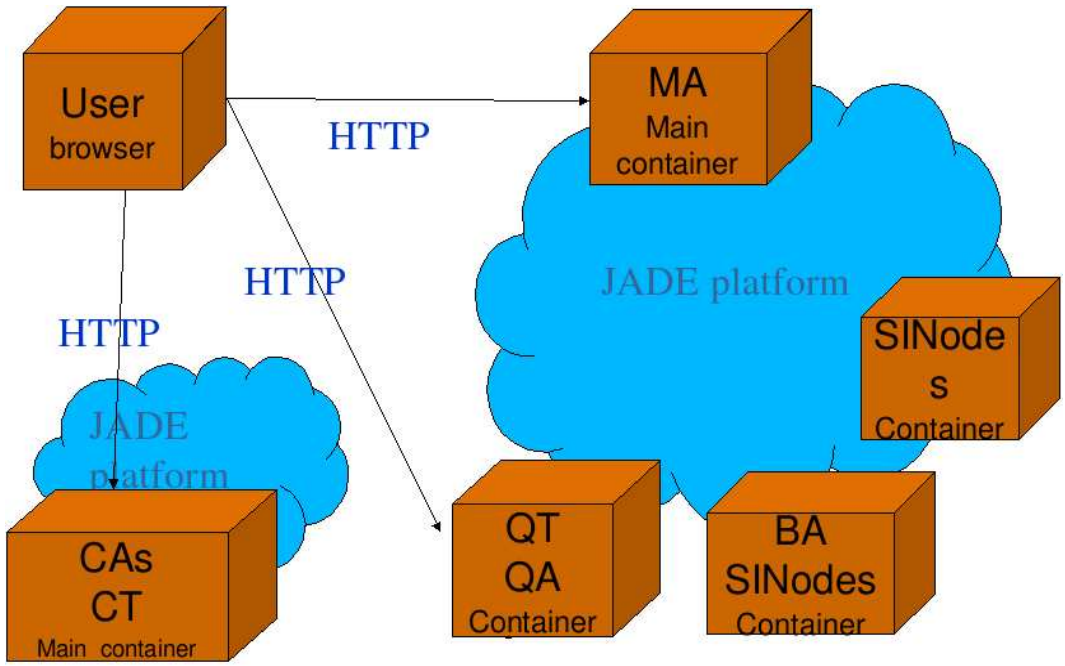
- there must be a main container for each platform, where the agent services run

- the SEWASIE system is deployed as a JADE platform with the following configuration:



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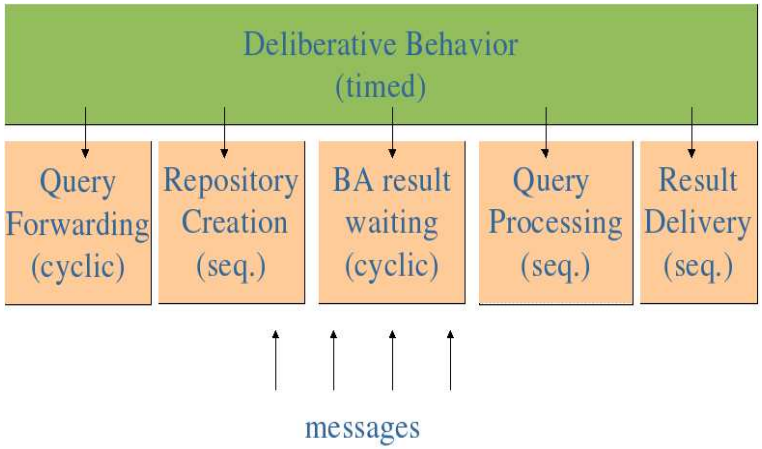

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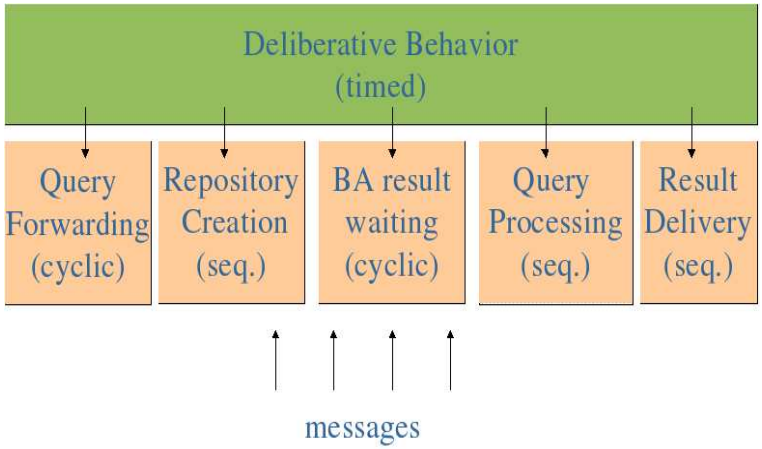

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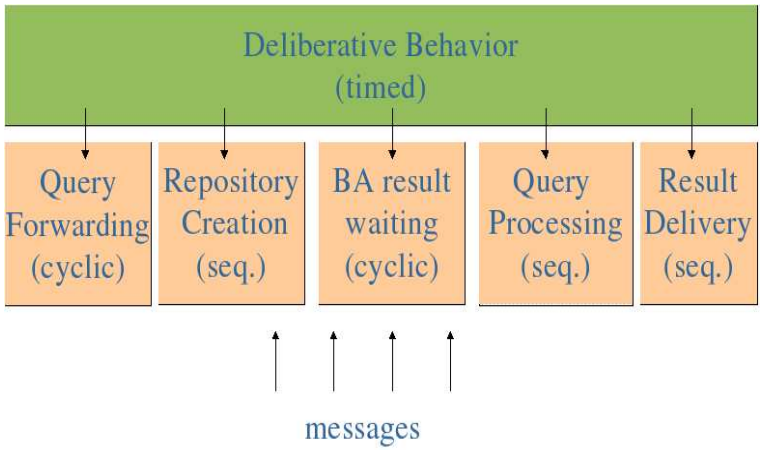

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- and a single deliberative behavior that checks the agent state, and decides which protocol must be started, finished or aborted behaviors.

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- sound and complete, efficient algorithm
- agent technology used for distributed query processing, and expanded features integration
- play with it! `sewasie.ing.unimo.it:8080/sewasie/index.html`

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Thank you!