



Università degli Studi dell'Aquila

Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

DALIA

a containerized launcher with a GUI for multi-agent-systems written
in DALI

with advanced example: Emergency Filtering/Evacuation/Response
MAS

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NETWORKS, AND DATA ANALYTICS*

1 Dalia

a containerized launcher with a GUI for multi-agent-systems written in DALI.

1.0.1 Pre-Requisites:

1. install sicstus
2. clone DALI:
 - check the compatibility table DALI-DALIA Compatibility
 - e.g.

```
git clone --branch 2024.10 --depth 1  
↪ https://github.com/AAAI-DISIM-UnivAQ/DALI
```

3. install docker

1.0.2 Installation

1. clone DALIA
 - check the compatibility table DALI-DALIA Compatibility
 - e.g.

```
git clone --branch 2025.09 --depth 1  
↪ https://github.com/alyshmahell/dalia
```

2. navigate into the cloned repo:

```
cd dalia
```

1.0.3 Usage

```
./run --sicstus <path_to_sicstus_directory> --dali  
↪ <path_to_dali_directory> --src <path_to_mas_directory>
```

- `path_to_mas_directory` is the path to the multi agent system you've written using DALI, you can use the example directory found in this repository in `path_to_mas_directory` when getting started.

1 DALI-DALIA Compatibility

DALI	DALIA
2024.10	2025.09

1 Emergency Filtering/Evacuation/Response MAS

Title: Multi-Agent System for Emergency Management in a City or Comune

1.1 Objective

This Multi agent System follows **GAIA methodology** in order to implement a Decentralized Emergency Filtering and Evacuation Response System using DALI.

1.2 Documentation:

1.2.1 1.1 Roles

Role	Main Responsibilities
Sensor	Detects ALL anomalies, filters out the Emergency ones (earthquake, fire, smoke), sending out either an alarm or a false-alarm.
Coordinator	Coordinates between the other agents, immediately evacuates, requests equipment from the manager, dispatches the responder with the proper equipment.
Evacuator	evacuates people from the affected location.
Manager	Evaluates and dispatches the proper equipment for the emergency type.
Responder	uses the equipment to counteract and remedy the emergency at the affected location.
Logger	Records all events, actions, and system status.
Communicator	sends mass alarms to citizens as a response of being informed by the coordinator of a disaster/emergency
Person	receives a copy of the mass alarms.

1.2.2 1.2 Virtual Organization

- **Name:** EmergencyFilteringEvacuationResponse
- **Goals:**
 - Minimize risks to people and infrastructure.
 - Ensure prompt and coordinated reaction to emergencies.
 - Support distributed decision-making among agents.
- **Roles and Interactions:**
 - Sensor → Coordinator: sends alarm messages.
 - Coordinator → Communicator: informs the communicator of emergency.
 - Communicator → Person: sends a mass alarm with the emergency it has been informed with.

- Coordinator → Evacuator: sends evacuation commands.
- Coordinator → Manager: requests equipment.
- Manager → Coordinator: dispatches equipment.
- Coordinator → Responder: sends emergency response command.
- Sensor/Coordinator/Manager/Evacuator/Responder → Logger: record of all relevant events and actions.

1.2.3 1.3 Event Table

Sensor

Event	Type	Source
sense (X)	external	environment
alarms (X)	internal	state
falarms (X)	internal	state

Coordinator

Event	Type	Source
alarm (X)	external	Sensor
equipped (E)	external	Manager
evacuated (L)	external	Evacuator
responded (L)	external	Responder
response (E, L)	internal	state
done (L)	internal	state

Evacuator

Event	Type	Source
evacuate (X)	external	Coordinator

Responder

Event	Type	Source
respond (L)	external	Coordinator

Manager

Event	Type	Source
emergency (E)	external	Coordinator
dispense (E)	internal	state

Logger

Event	Type	Source
generic (E, L)	external	agents
alarm (E, L)	external	agents
falarm (E, L)	external	agents
message (X)	external	agents

Communicator

Event	Type	Source
communicate (Targets, Content)	external	Coordinator

Person

Event	Type	Source
message (Content)	external	Communicator

1.2.4 1.4 Action Table**Sensor**

Action	Description
log (X)	sends events to the Logger

Coordinator

Action	Description
equip (X)	sends equipment request to the Manager
evacuate (X)	sends evacuation command to the Evacuator using the inform FIPA performative
log (X)	sends events to the Logger

Evacuator

Action	Description
<code>log (X)</code>	sends events to the Logger

Manager

Action	Description
<code>log (X)</code>	sends events to the Logger

Responder

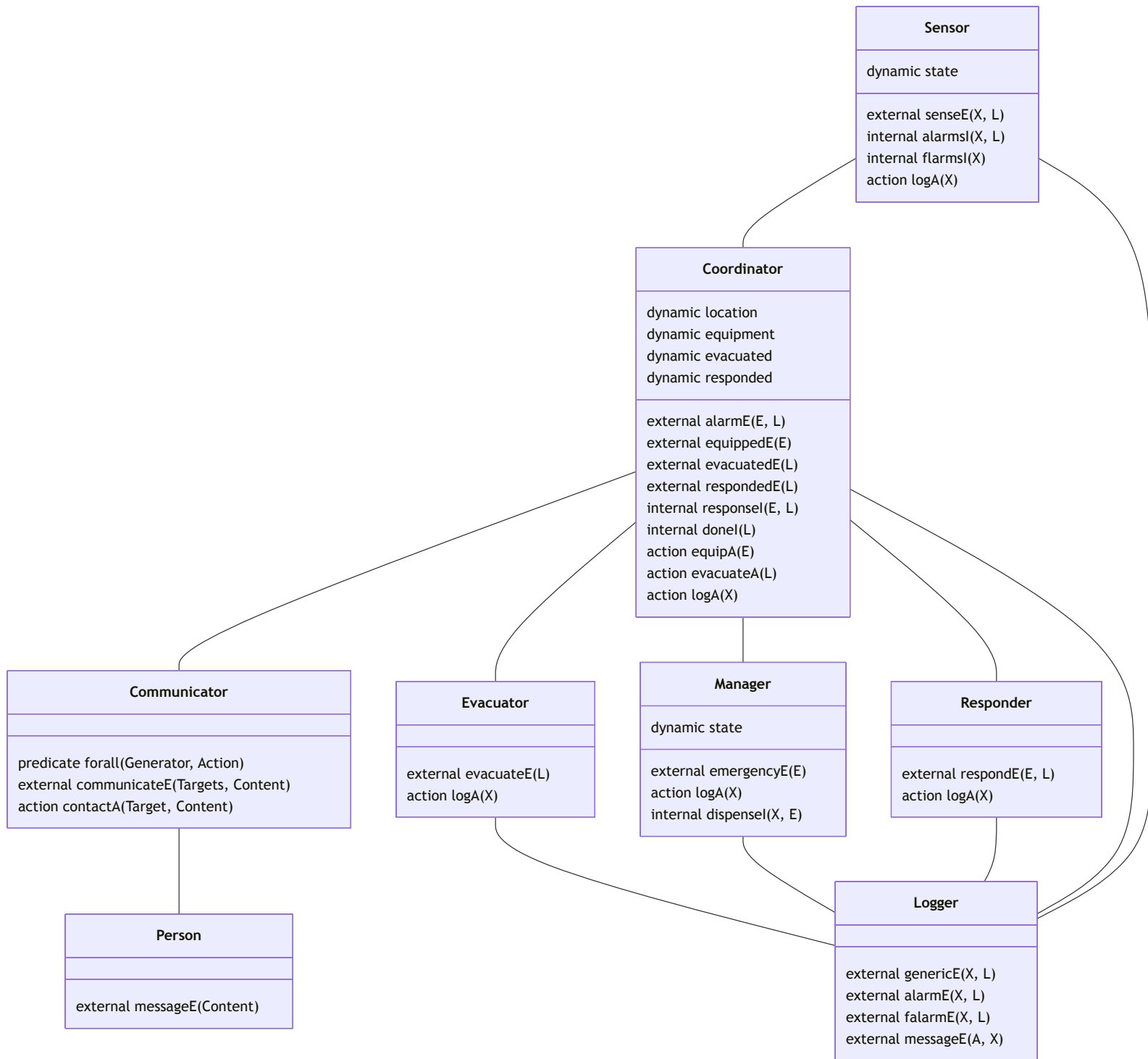
Action	Description
<code>log (X)</code>	sends events to the Logger

Communicator

Action	Description
<code>contact (Target, Content)</code>	sends Content to a Target of type Person

1.2.5 1.5 Agent Behaviors

- **Sensor:** Proactive; generates states upon detecting anomalies, filters out alarms from false and informs the coordinator, and Proactive for its use of internal states and events.
- **Coordinator:** reactive to incoming alarms; proactive in managing the response strategy according to incoming equipment, also proactive in managing its states until it achieve equilibrium (internal event done), and Proactive for its use of internal states and events. uses the **inform FIPA performative** to tell the communicator to mass inform the people in a disaster zone the type of disaster (mass alarm).
- **Evacuator:** reactive to evacuation commands; can report issues or confirmation.
- **Manager:** Proactive by evaluating which equipment belongs to which emergency response, and its use of internal states and events.
- **Responder:** reactive to response commands; can report issues or confirmation.
- **Logger:** reactive; logs every received message or command.
- **Communicator:** hybrid reactive/proactive; receives a list of targets and a message content as a result of an **inform FIPA performative** and maps that content to a message to be mass sent to all targets.
- **Person:** reactive; receives a copy of the mass message content.



Sequence Diagram - Emergency Filtering/Evacuation/Response MAS

