

Introduction to Distributed and Embedded Multi-agent Systems

Carlos Eduardo Pantoja¹
Nilson Mori Lazarin^{1,2}

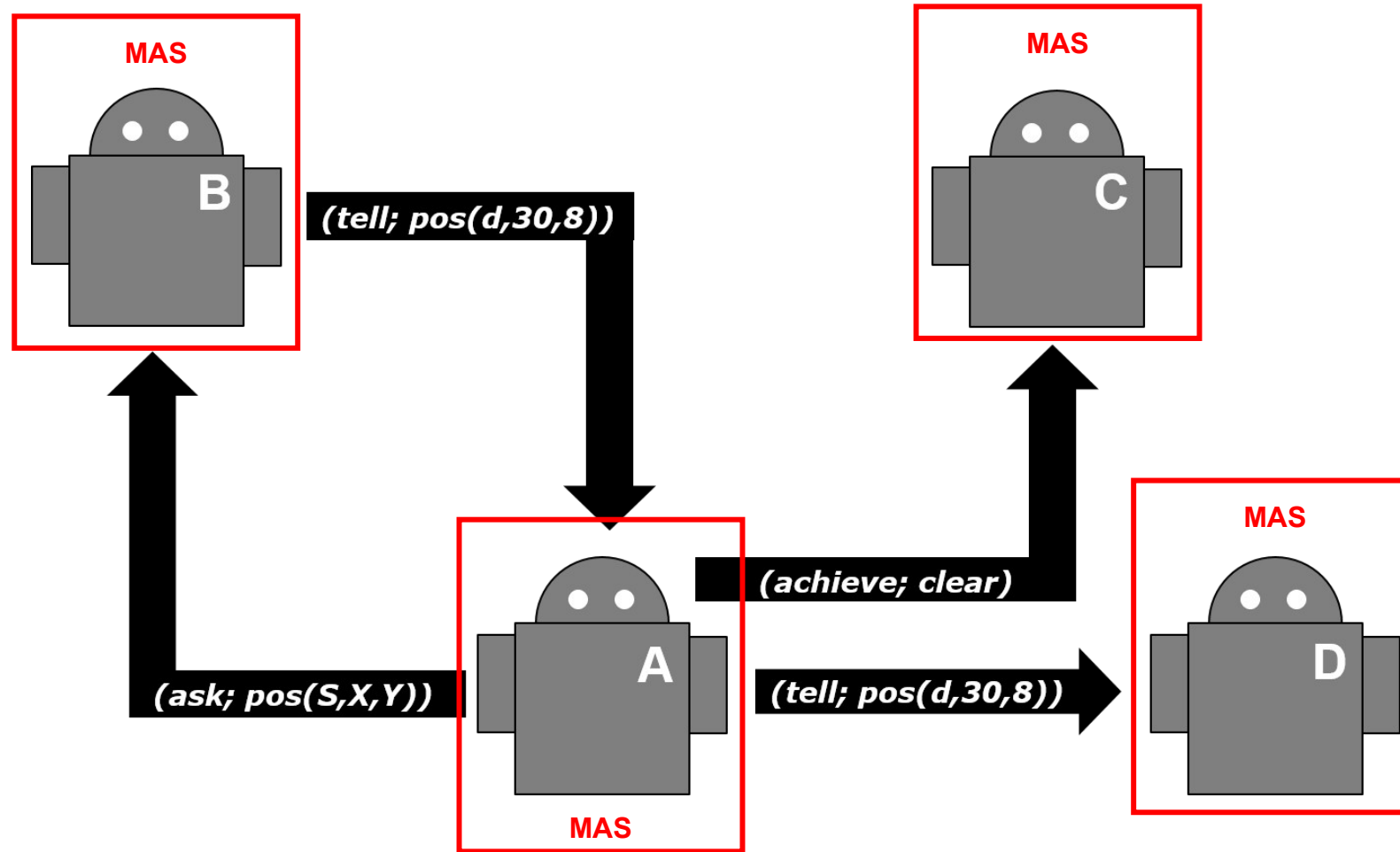
1. Centro Federal de Educação Tecnológica (CEFET/RJ) - 2. Universidade Federal Fluminense (UFF), Brasil



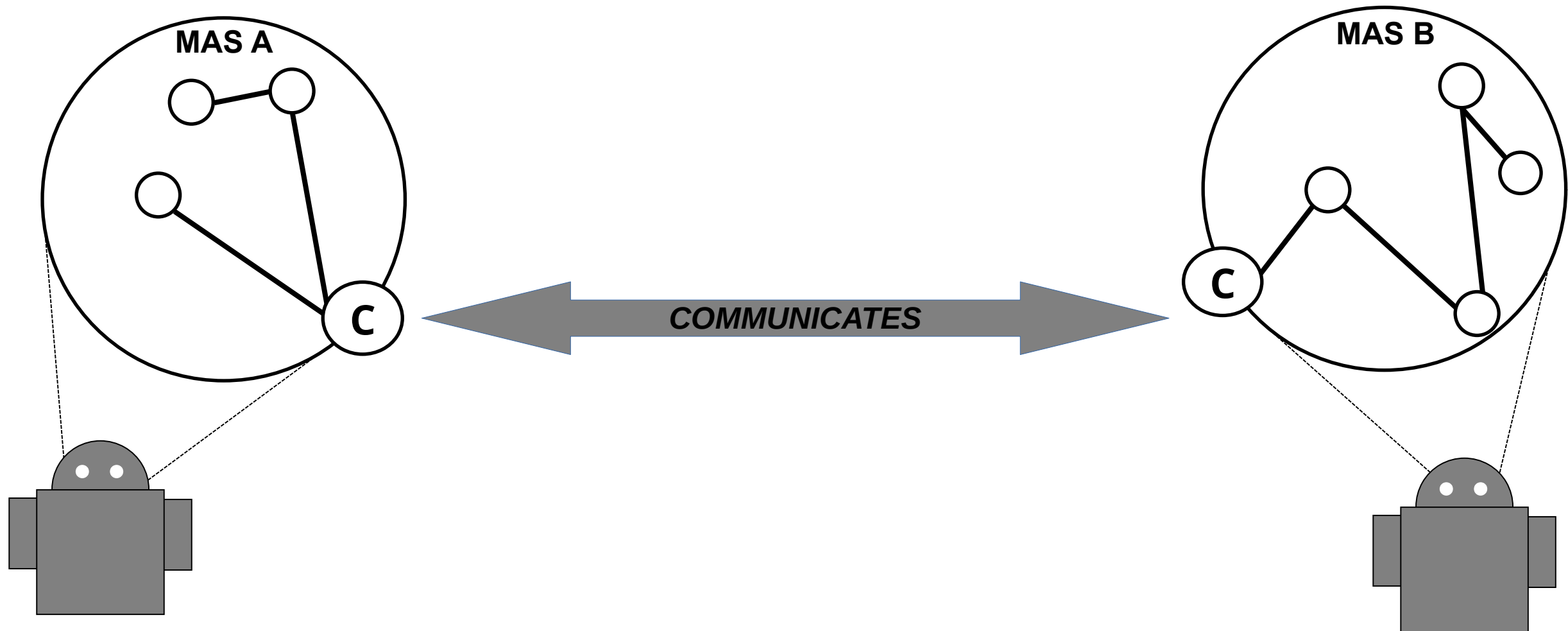
Junho, 2024

Collaborative MAS

Collaborative MultiAgent System

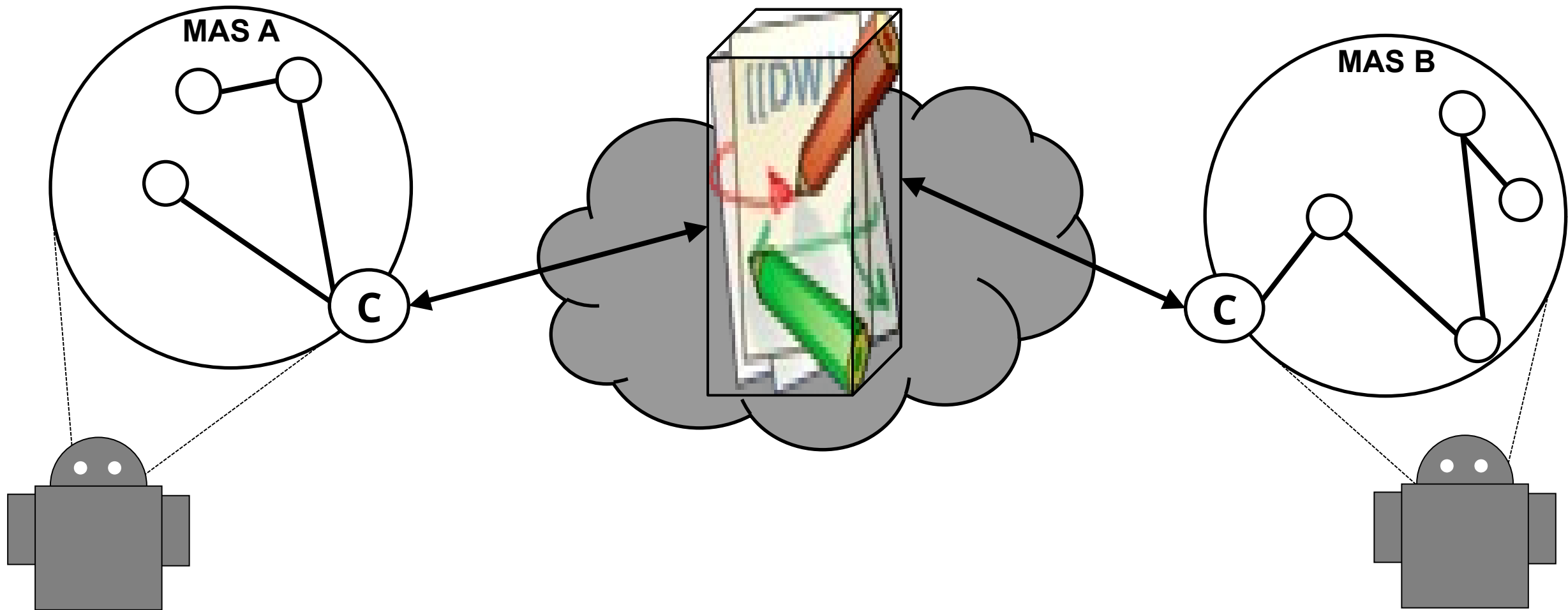


Agentes Comunicadores



Pantoja, C., Soares, H.D., Viterbo, J., Seghrouchni, A.E.F. "An Architecture for the Development of Ambient Intelligence Systems Managed by Embedded Agents". The 30th International Conference on Software Engineering and Knowledge Engineering, Hotel Pullman, Redwood City, California, USA, July 1-3, 2018, organizado por Óscar Mortágua Pereira, KSI Research Inc. and Knowledge Systems Institute Graduate School, 2018, <https://doi.org/10.18293/SEKE2018-110>.

Agentes Comunicadores: Service Communication



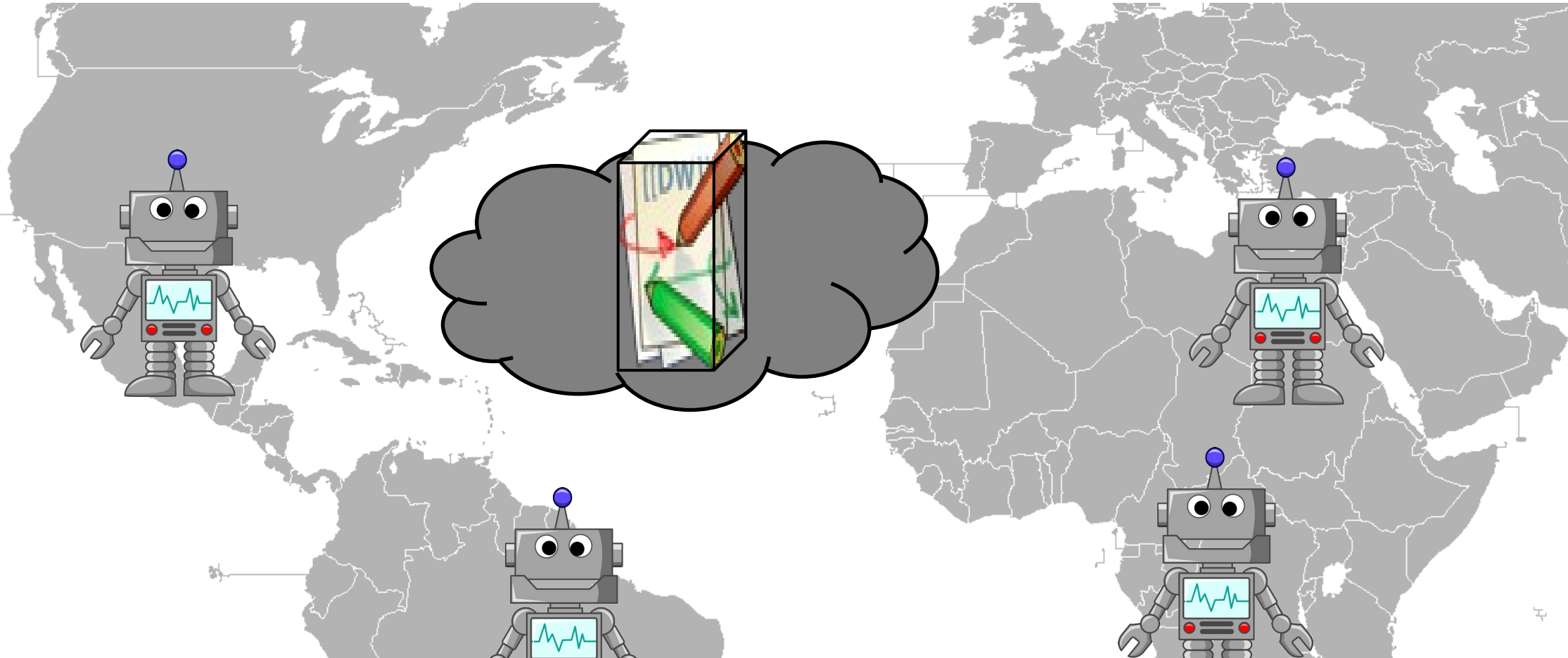
Endler, M., Baptista, G., Silva, L.D., Vasconcelos, R., Malcher, M., Pantoja, V., Pinheiro, V., Viterbo, J.: Contextnet: Context reasoning and sharing middleware for large-scale pervasive collaboration and social networking. In: Proceedings of the Workshop on Posters and Demos Track. PDT '11, Association for Computing Machinery, New York, NY, USA (2011). <https://doi.org/10.1145/2088960.2088962>

Agentes Comunicadores: Middleware IoT

O ContextNet é um *middleware* que visa a **aplicações colaborativas** abrangentes de pequena e grande escala, como **monitoramento on-line** ou **coordenações de atividades** de **entidades móveis** e **compartilhamento de informações**.

ContextNet Public Server

Address: skynet.chon.group - UDP Port: 5500



Agentes Comunicadores: Ações Internas

- **Communicator** Internal Actions:

- **sendOut**(agentUuid, force, message)

- envia uma mensagem de um agente comunicador para outro comunicador de um SMA distinto.

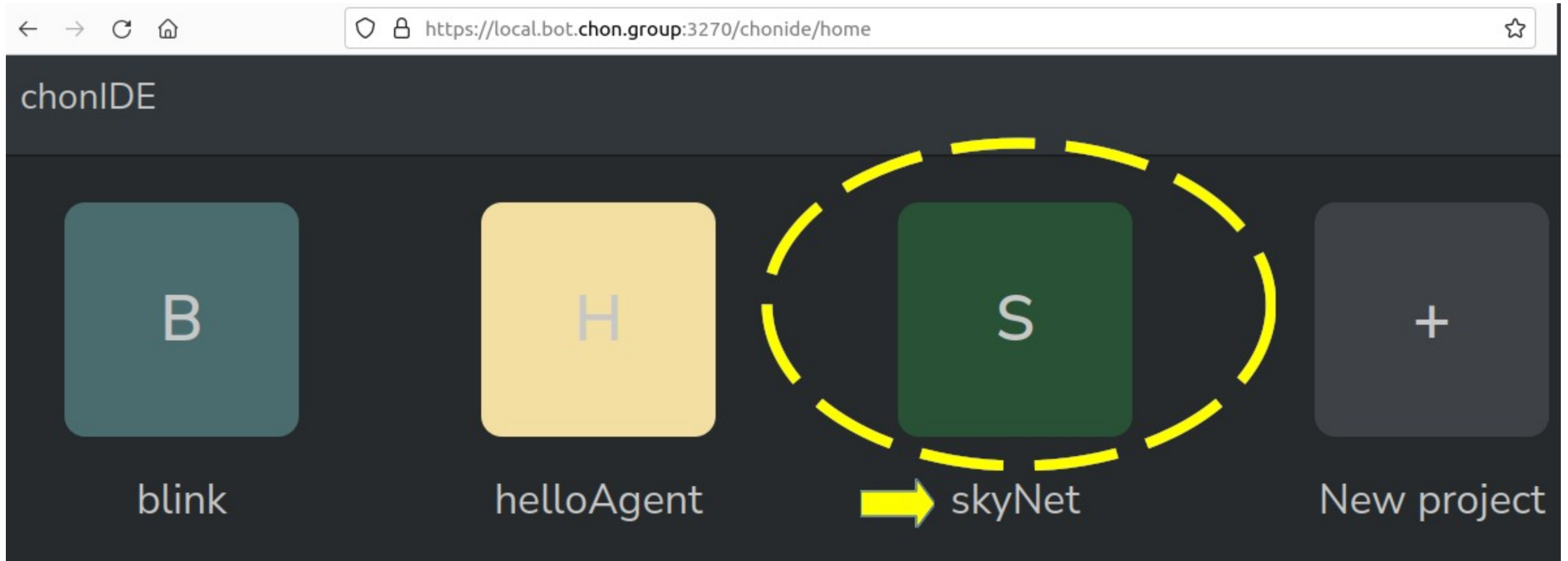
- **connectCN**(servidor, porta, UUID)

- se conecta ao servidor IoT com um id específico para o agente.

- **disconnectCN**

- desconecta do servidor IoT atualmente conectado.

Hello SkyNet



Hello SkyNet

The screenshot shows the chonIDE interface. At the top, there's a toolbar with a green play button (labeled '2' with a yellow arrow) and a red stop button. Below the toolbar, the project structure is visible on the left, with 'skyNet' selected. The 'Agents' folder is expanded, showing 'kirk' and 'uhura'. The 'kirk' agent is selected, and its code is displayed in the editor. The code is a Prolog-like script for a multi-agent system. A yellow circle with the number '1' and a yellow arrow points to the 'gateway' function call on line 7.

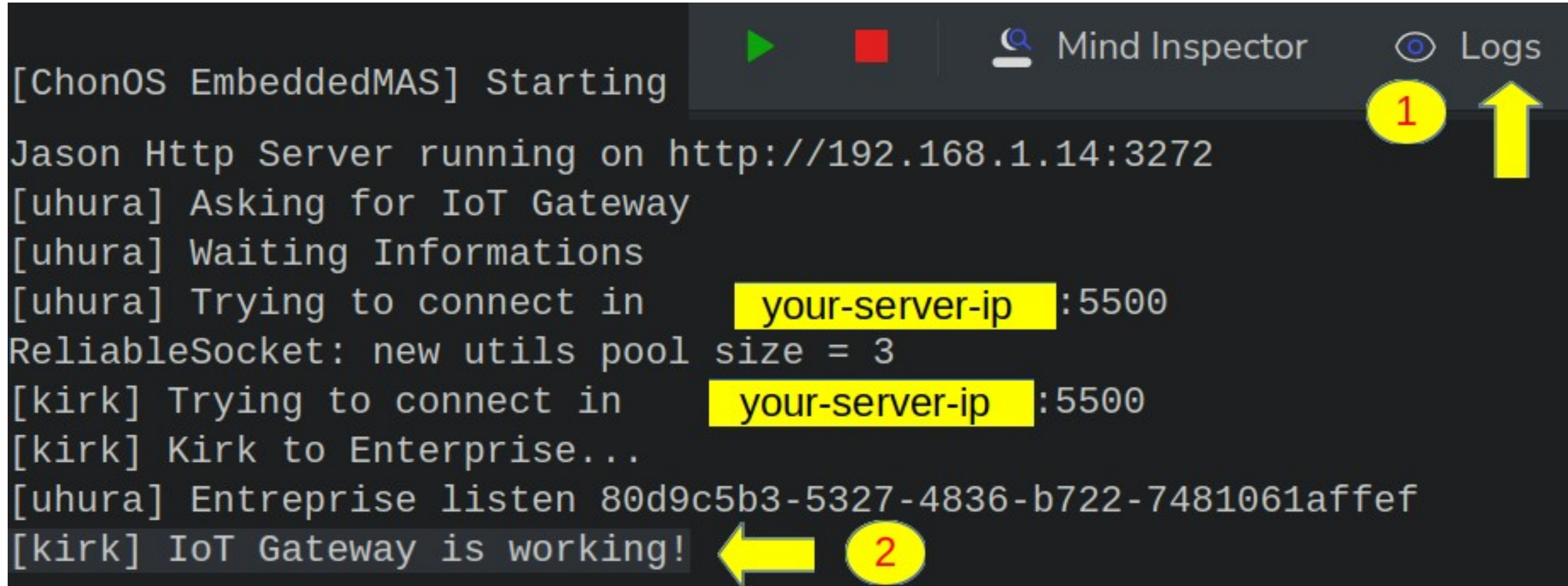
```
/* To generate a random UUID use https://www.uuidgenerator.net/ */
kirkUUID("80d9c5b3-5327-4836-b722-7481061affef").
uhuraUUID("af467a22-eafc-4e87-9f57-882740ab0710").

/* We provide a Public IoT Gateway, more info in https://doi.org/10.5753
/wei.2023.229753 */
gateway("YOUR-SERVER-IPv4",5500).

/* Plans */

+!testComm: uhuraUUID(Uhura) & not communication(ok)<-
.print("Kirk to Enterprise...");
```

Hello SkyNet

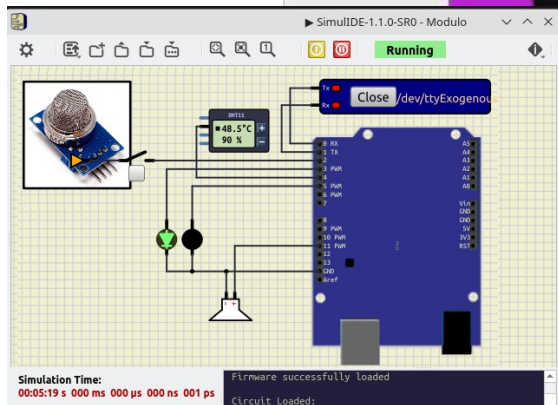


```
[ChonOS EmbeddedMAS] Starting
Jason Http Server running on http://192.168.1.14:3272
[uhura] Asking for IoT Gateway
[uhura] Waiting Informations
[uhura] Trying to connect in your-server-ip:5500
ReliableSocket: new utils pool size = 3
[kirk] Trying to connect in your-server-ip:5500
[kirk] Kirk to Enterprise...
[uhura] Enterprise listen 80d9c5b3-5327-4836-b722-7481061affef
[kirk] IoT Gateway is working!
```

Exemplo: Colaboração entre SMA Embarcados



<https://github.com/chon-group/distributedAndEmbeddedAI/tree/main/course/13-CollaborativeMultiAgentSystems/example>



OBRIGADO!

pantoja@cefet-rj.br
nilson.lazarin@cefet-rj.br

