

Introduction to Distributed and Embedded Multi-agent Systems

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MOBILITY IN EMBEDDED MAS

Protocolo de Transferência de Agentes

Os agentes móveis são agentes especiais **capazes de transcender** seu SMA podendo mover-se, por exemplo, para outro SMA. Os agentes móveis também são **capazes de interagir** com agentes de outros SMA e também transferir-se para um ambiente chamado de ambiente aberto, onde agentes de diferentes SMA podem interagir e trocar informações.

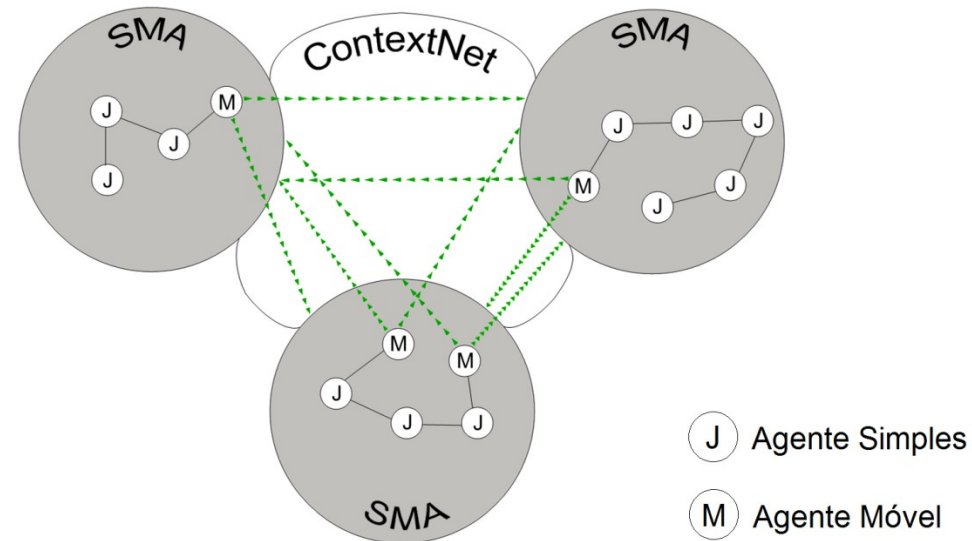


Figura 1. Transferência de agentes móveis

Protocolo de Transferência de Agentes

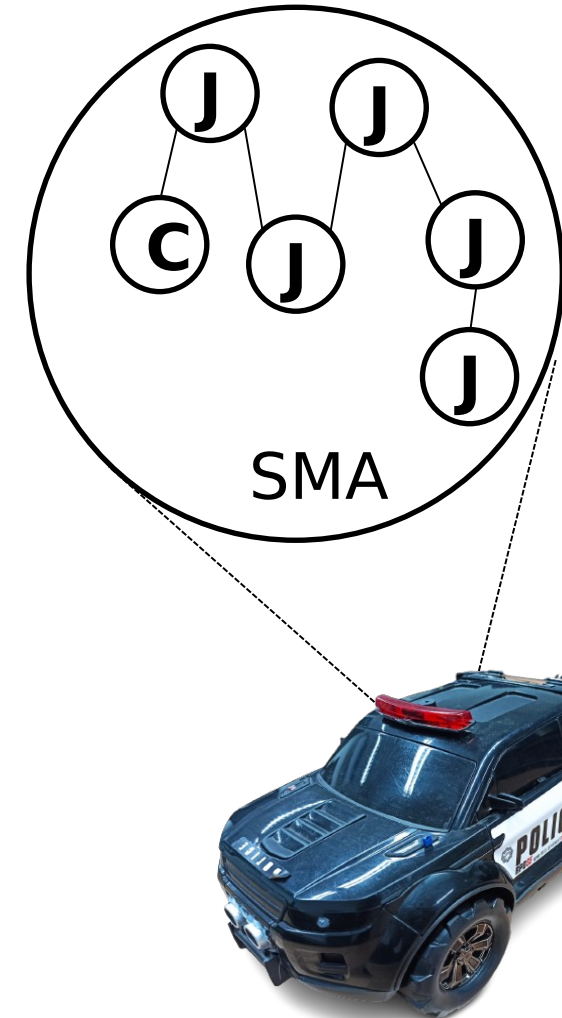
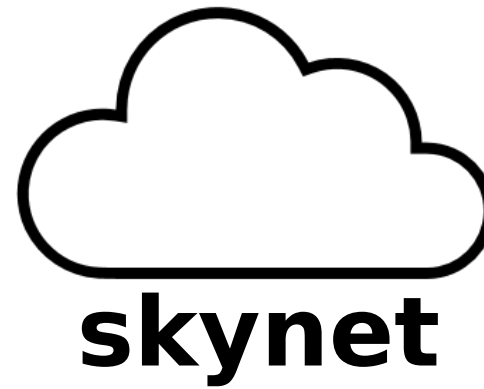
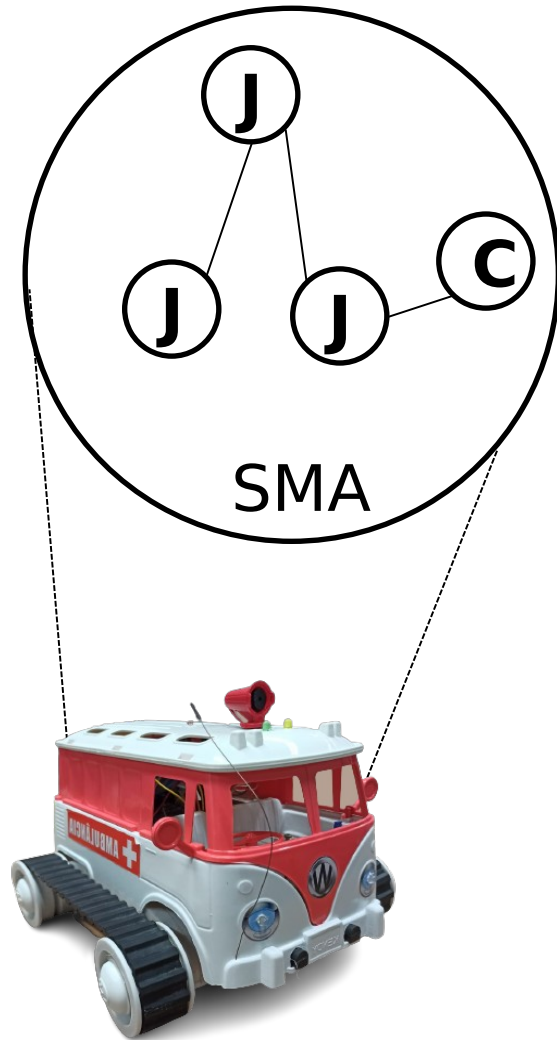
Um **agente cognitivo** está situado em um **SMA** qualquer e ambientado em um **dispositivo**, este agente fica “preso” ao SMA e ao dispositivo, e caso o dispositivo seja danificado o agente cognitivo **não consegue se transferir** para outro SMA.

Protocolo de Transferência de Agentes

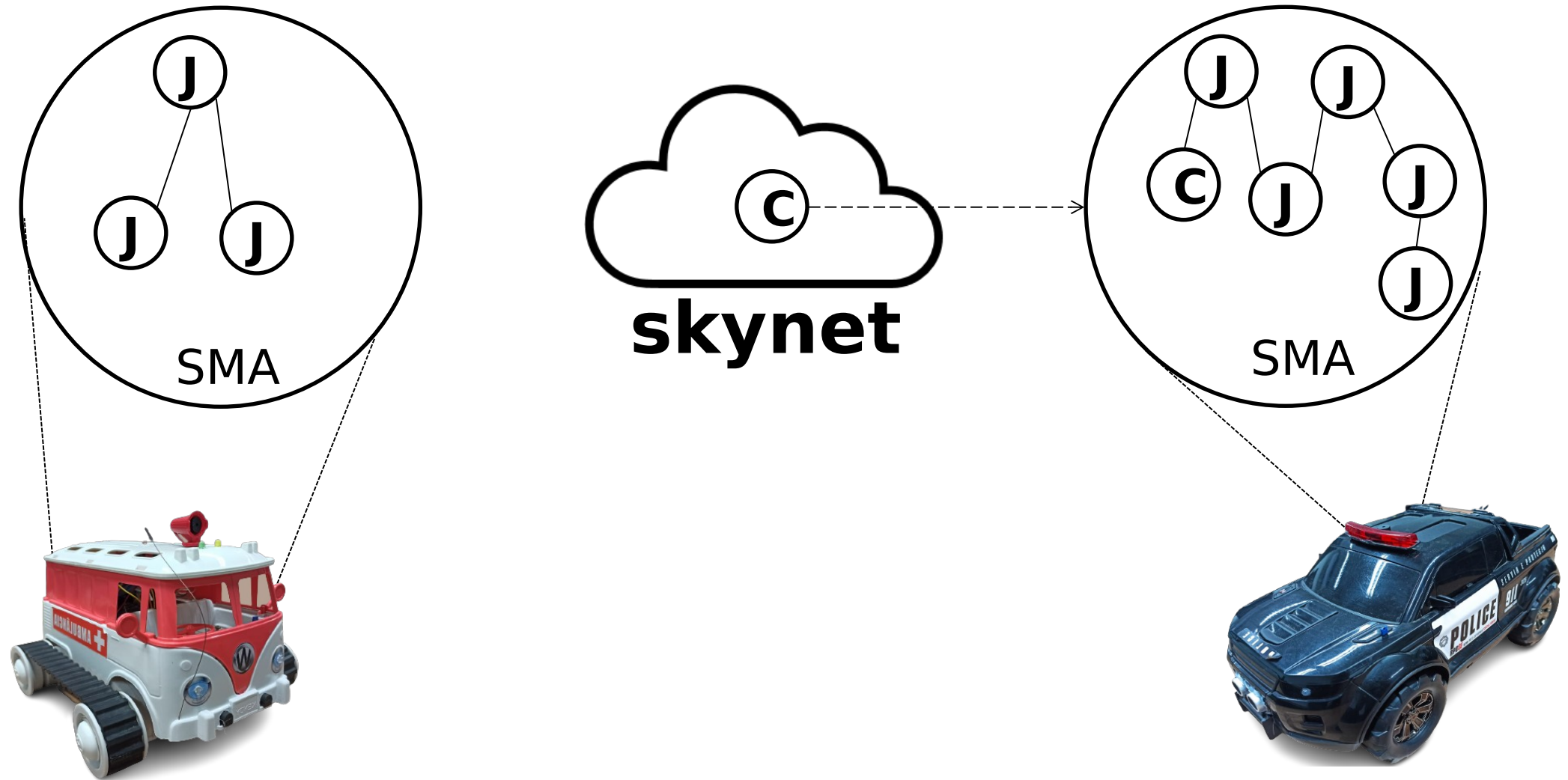
O protocolo de transferência de agentes prevê três possíveis relações entre o agente móvel com o novo SMA.

- Mutualismo
- Inquilinismo
- Predatismo

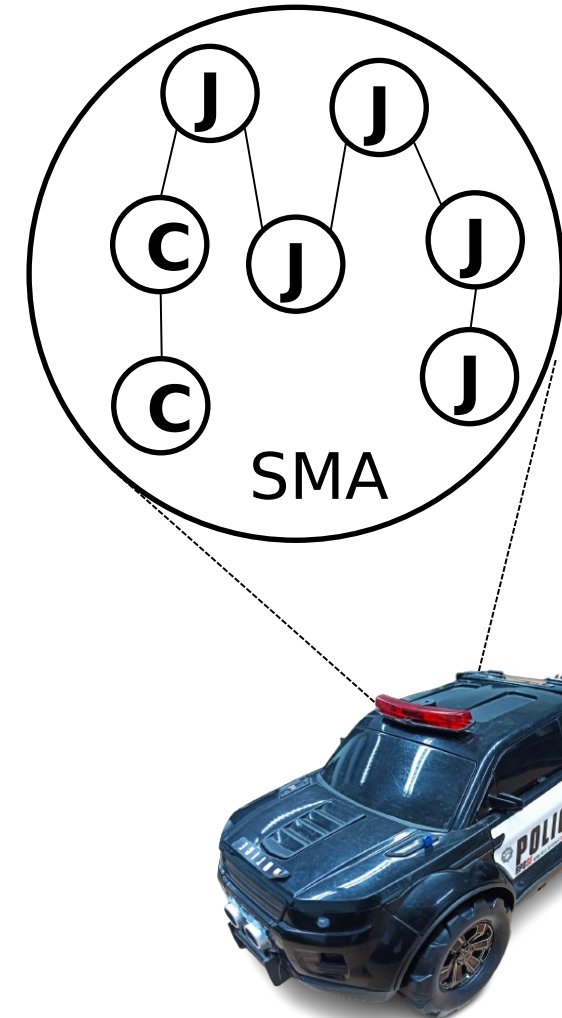
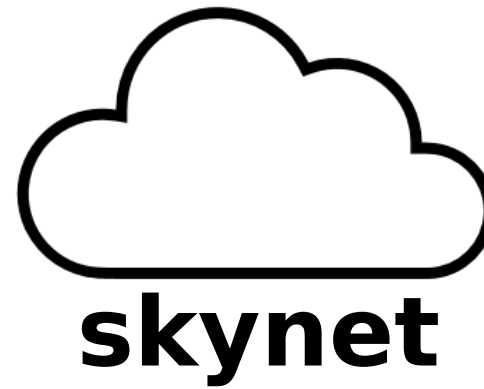
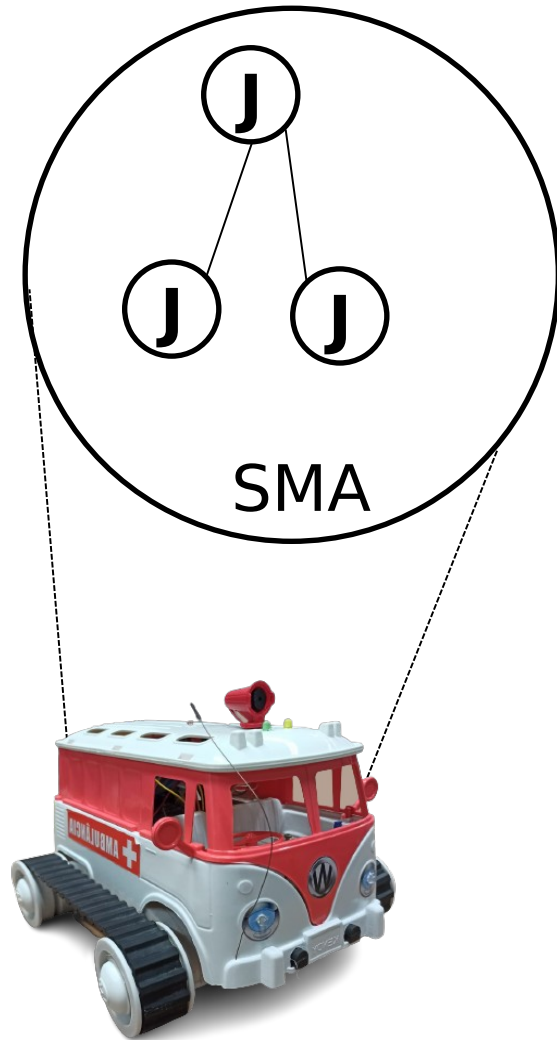
Bio-Inspired: Mutualismo



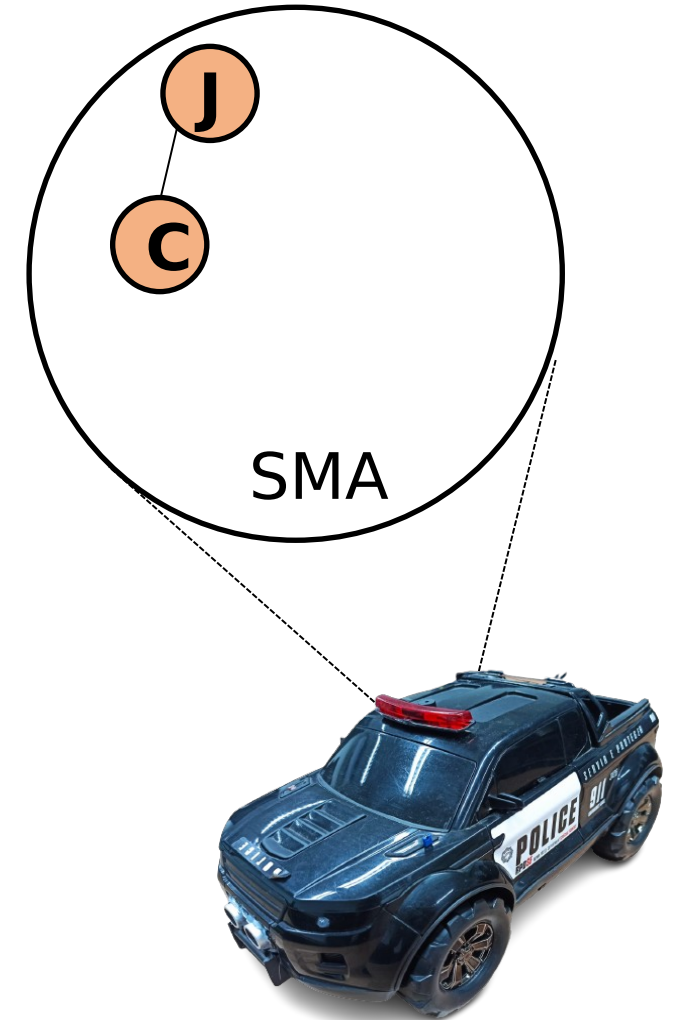
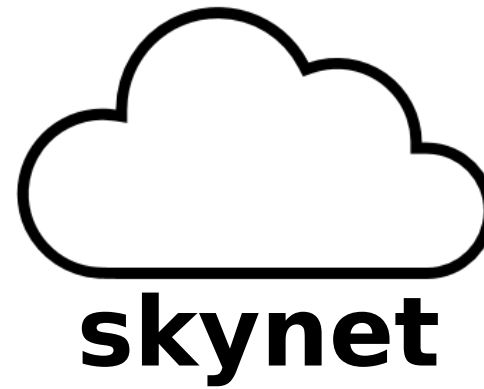
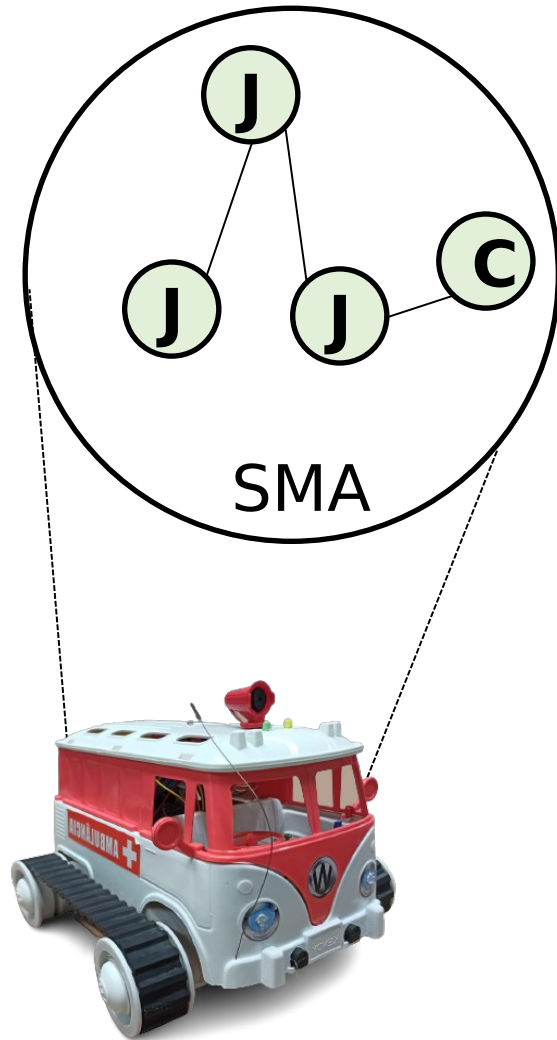
Bio-Inspired: Mutualismo



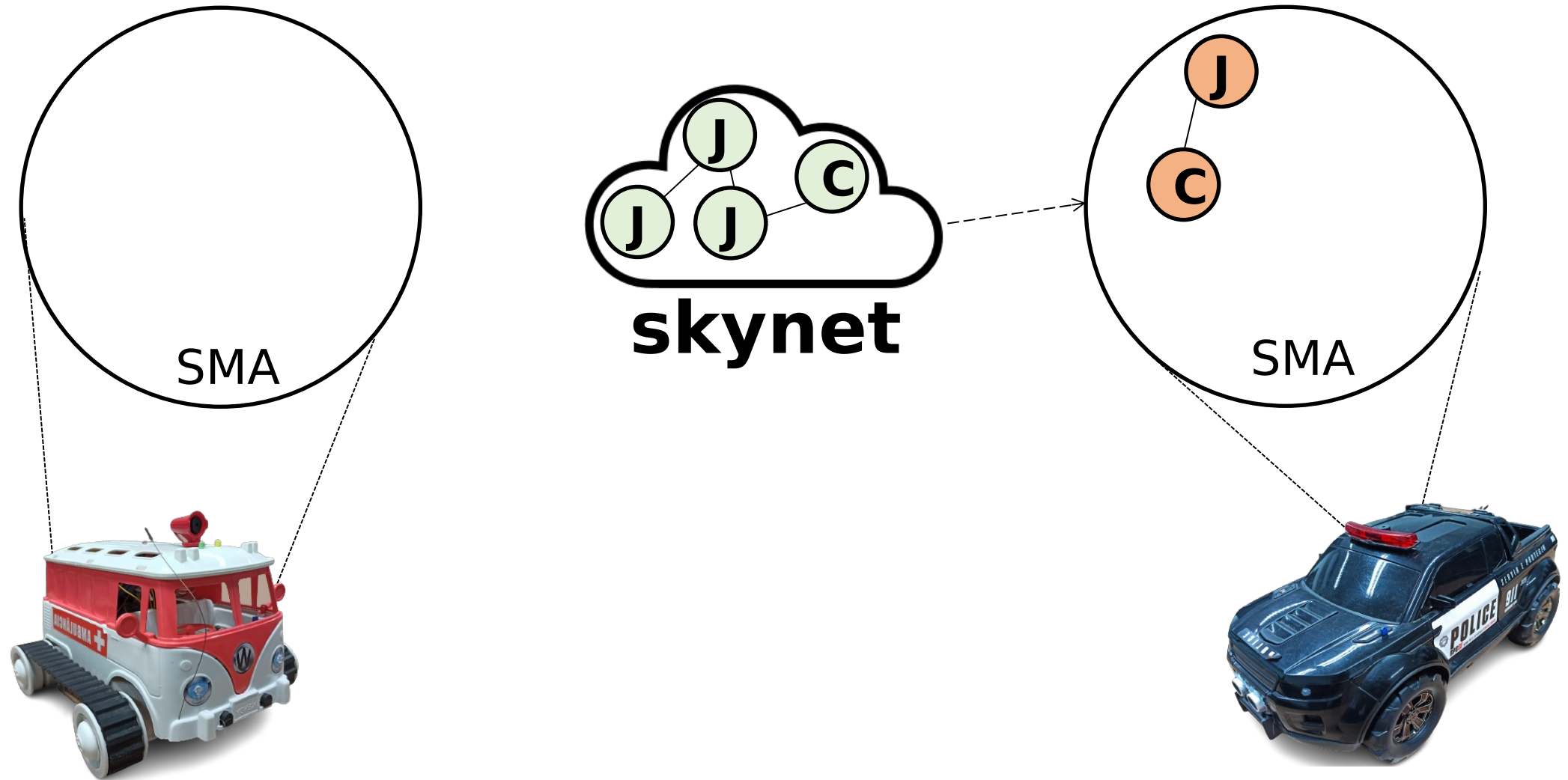
Bio-Inspired: Mutualismo



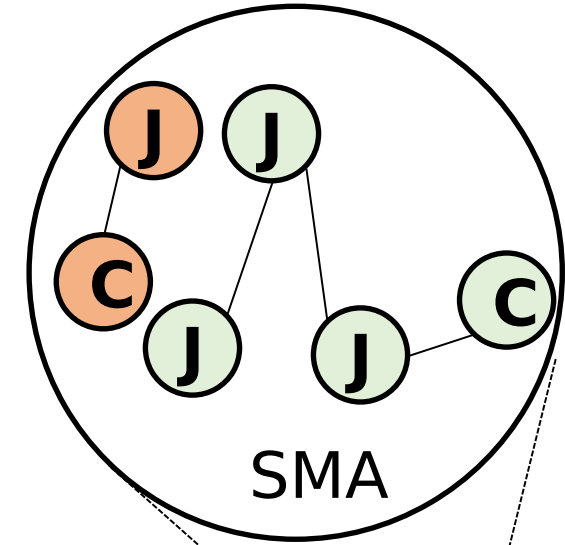
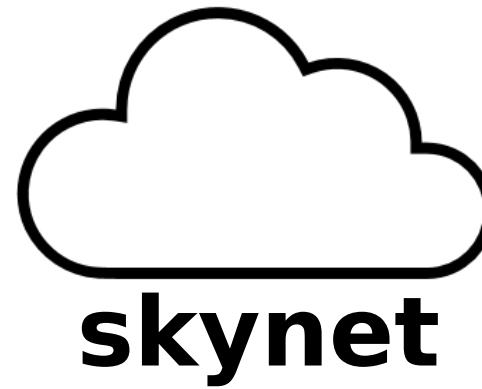
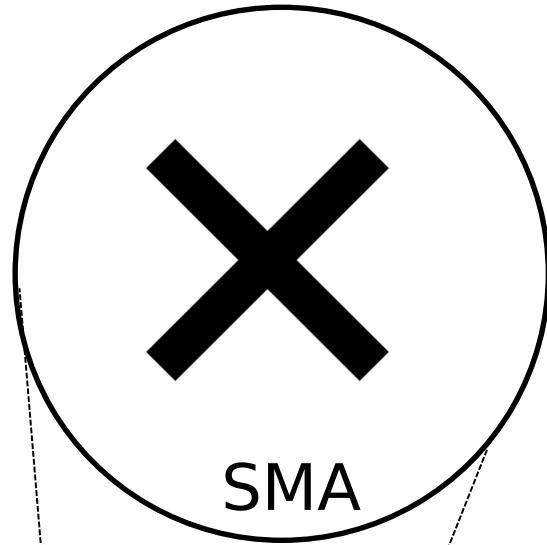
Bio-Inspired: Inquilinismo



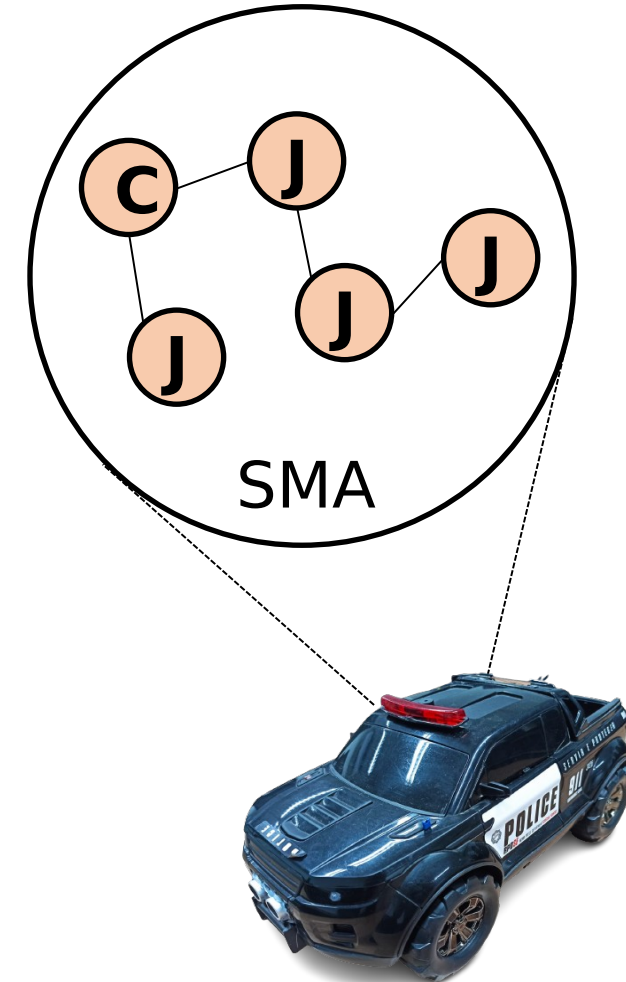
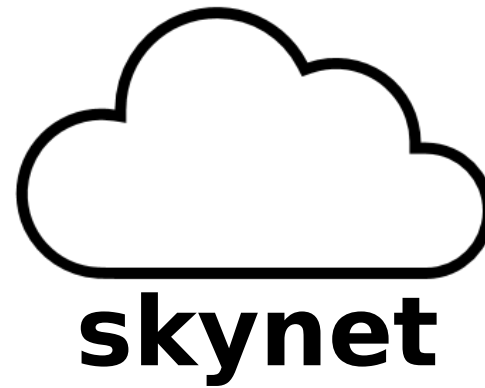
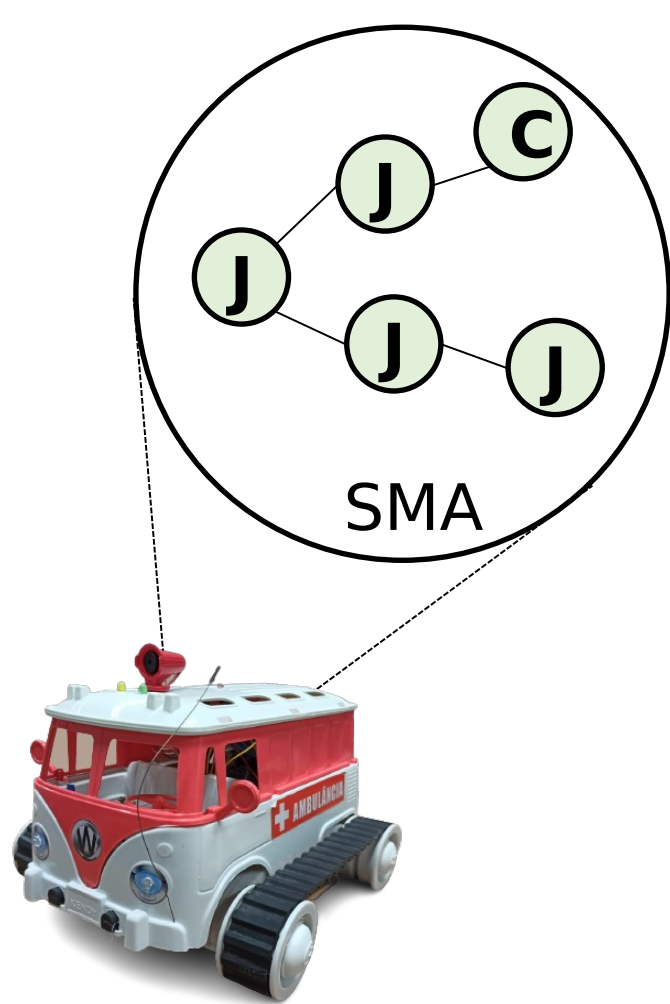
Bio-Inspired: Inquilinismo



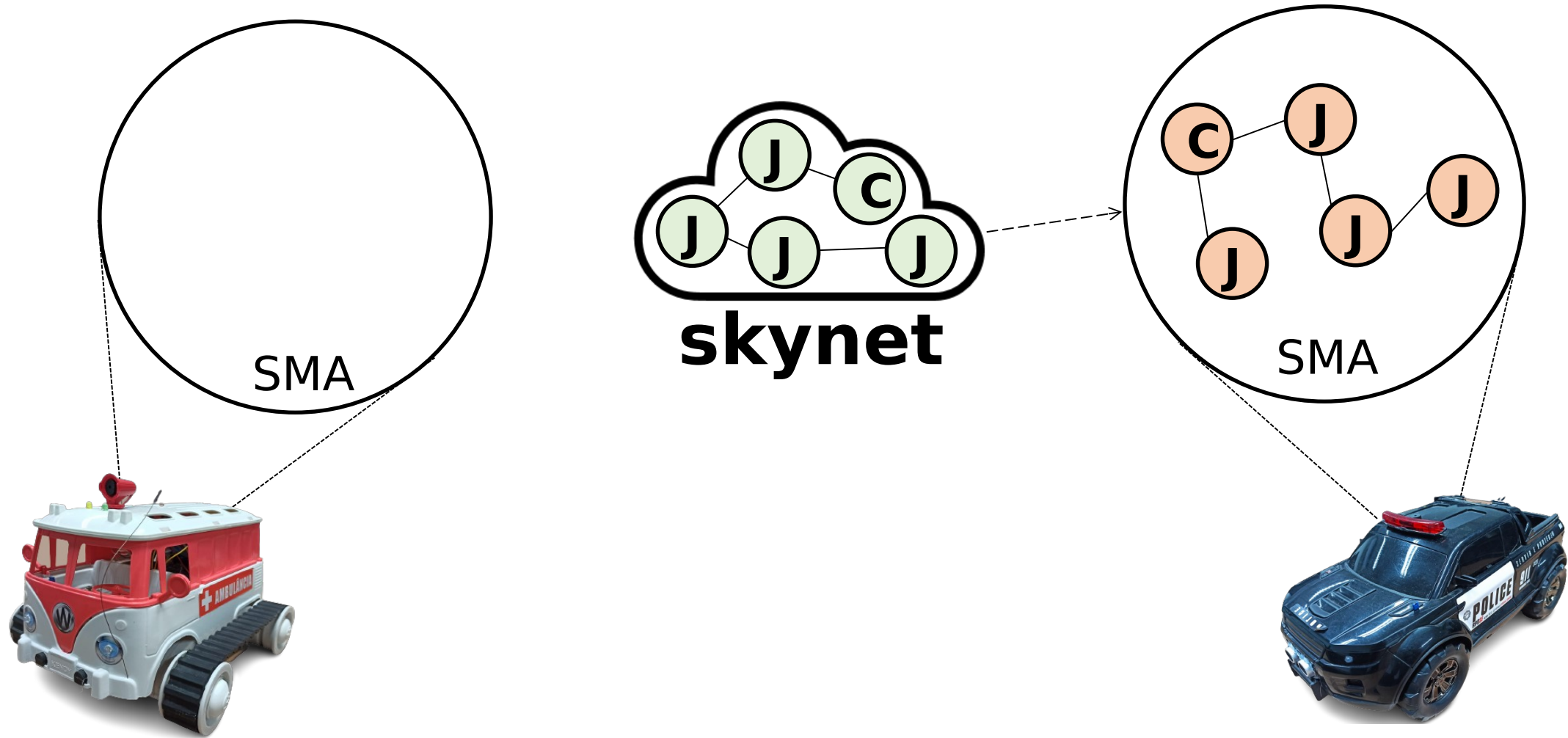
Bio-Inspired: Inquilinismo



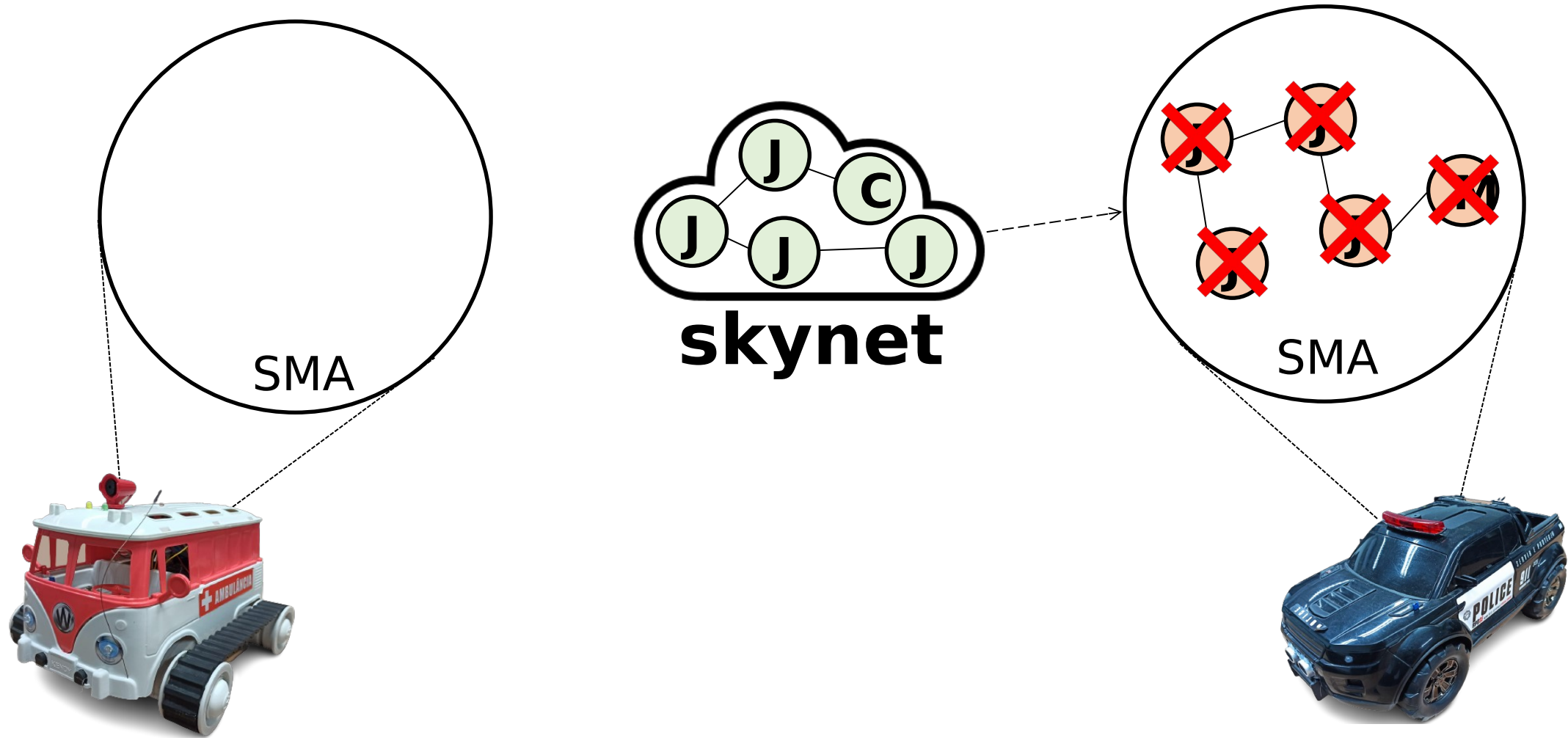
Bio-Inspired: Predatismo



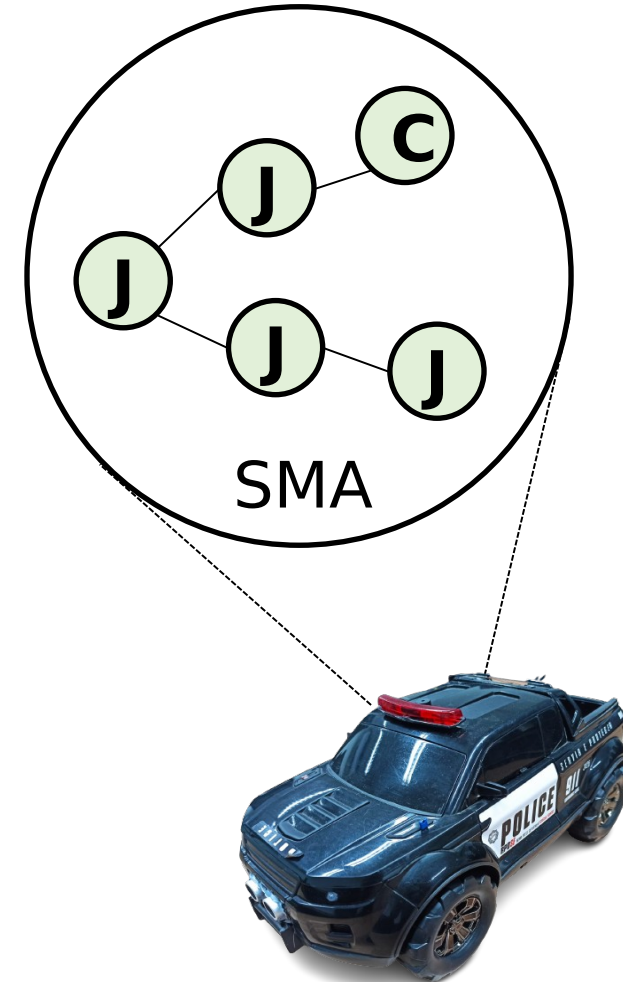
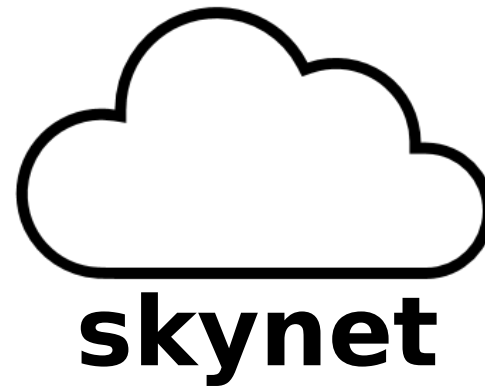
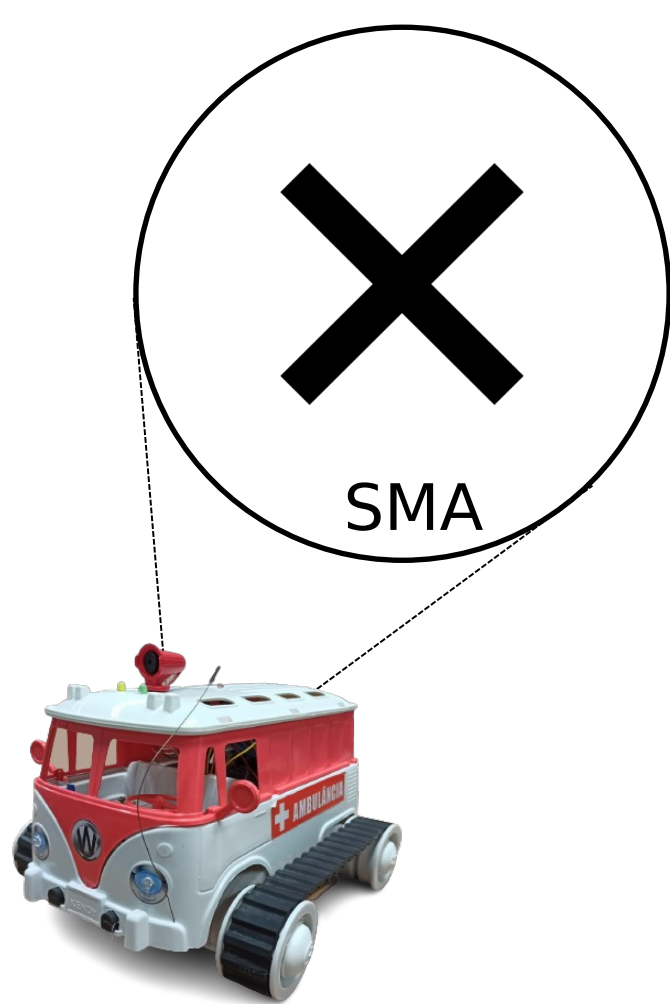
Bio-Inspired: Predatismo



Bio-Inspired: Predatismo



Bio-Inspired: Predatismo



Communicator: Ações Internas

- **Communicator** Internal Actions:

.moveOut(agentUuid, predation|inquilinism)

move os agentes para um SMA.

.moveOut(agentUuid, mutualism, agent)

envia um agente específico para outro SMA.

Exemplo: Bio-Inspired Protocol



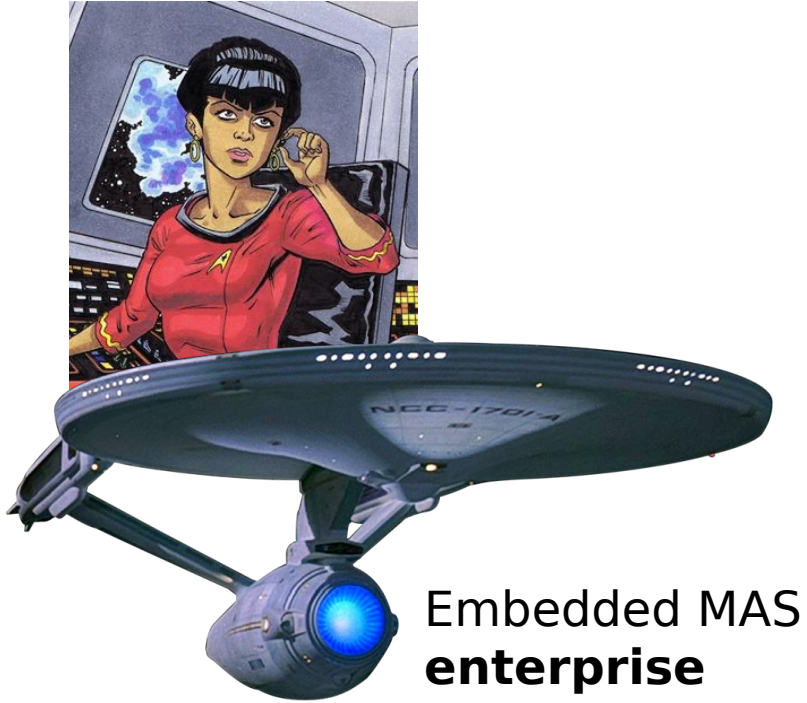
Exemplo: Bio-Inspired Protocol



Embedded MAS
enterprise

Exemplo: Bio-Inspired Protocol

agent **uhura**



Exemplo: Bio-Inspired Protocol

agent **uhura**



agent **scott**



Embedded MAS
enterprise

Exemplo: Bio-Inspired Protocol

agent **uhura**

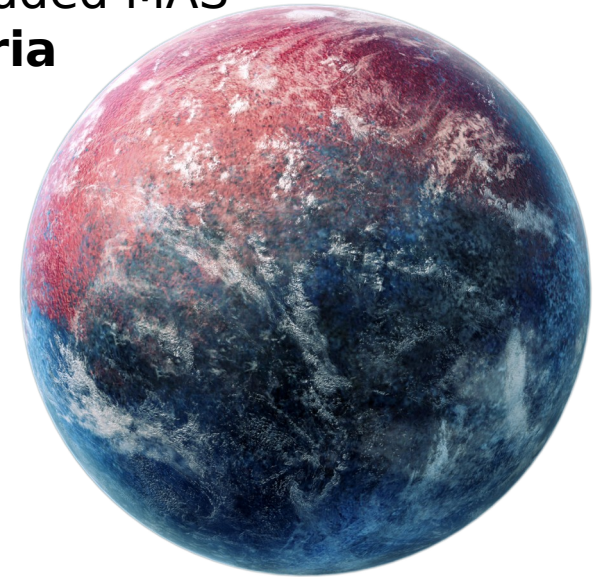


agent **scott**



Embedded MAS
enterprise

Embedded MAS
andoria



Exemplo: Bio-Inspired Protocol

agent **uhura**



agent **scott**

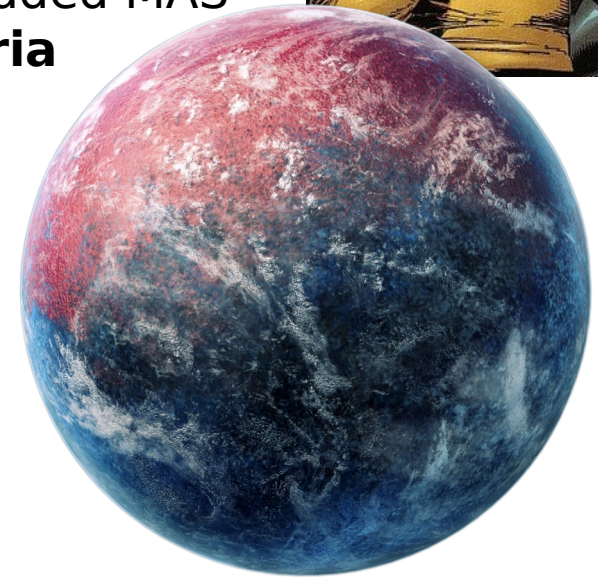


Embedded MAS
enterprise

agent **kirk**



Embedded MAS
andoria



Exemplo: Bio-Inspired Protocol

agent **uhura**



agent **scott**



Embedded MAS
enterprise

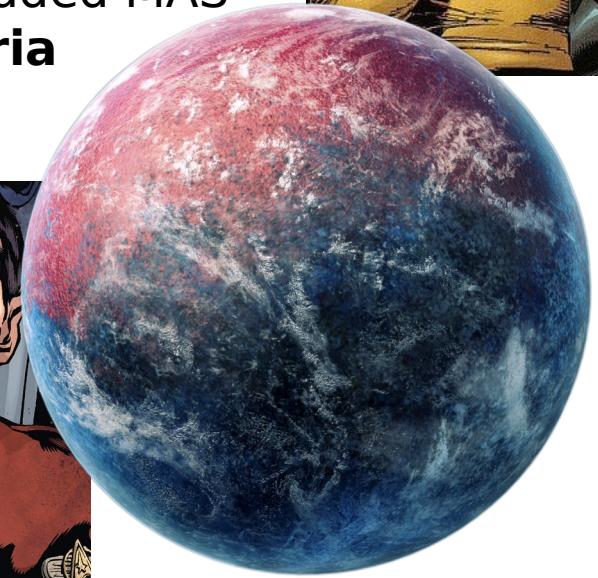
agent **kirk**



Embedded MAS
andoria



agent **spok**



Exemplo: Bio-Inspired Protocol



Exemplo: Bio-Inspired Protocol

Computer,
Commander
Montgomery Scott,
Chief Engineering
Office!



Exemplo: Bio-Inspired Protocol



Computer,
Commander
Montgomery Scott,
Chief Engineering
Office!

Kirk to Scotty...
Beam us up!



Exemplo: Bio-Inspired Protocol



Computer,
Commander
Montgomery Scott,
Chief Engineering
Office!

Kirk to Scotty...
Beam us up!

Transporter ready for
Kirk and Spok.



Exemplo: Bio-Inspired Protocol



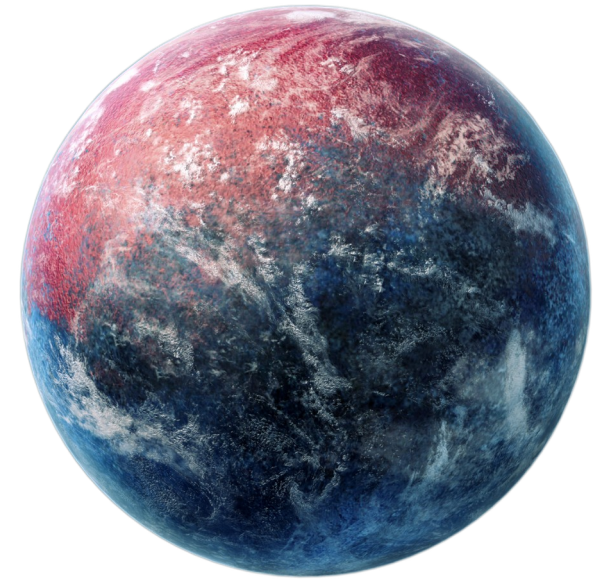
Computer, Commander James T. Kirk, Enterprise's Captain! I'm aboard!



Exemplo: Bio-Inspired Protocol



Computer, Commander
James T. Kirk, Enterprise's
Captain! I'm aboard!



Exemplo: Bio-Inspired Protocol



```
◇ scott.asl
2 //https://www.uuidgenerator.net/
3 myUUID("07ba9e4a-d539-4a0e-8c14-4ac336476858").
4
5 //skyNetAddress(skynet.chon.group).           //public SkynetServer
6 skyNetAddress("192.168.0.103").               //local IP of Your SkynetServer
7 skyNetPort(3273).
8
9 /* Initial goals */
10 !start.
11
12 /* Plans */
13 +!start : true <-
14     ?myUUID(ID);
15     ?skyNetAddress(Server);
16     ?skyNetPort(Port);
17     .print("Computer, Commander Montgomery Scott, Chief Engineering Office");
18     .connectCN(Server,Port,ID).
19
20 +beam_us_up_scotty[source(X)] <-
21     .print("Transporter ready for ",X);
22     .sendOut(X,tell,energizing);
23     -beam_us_up_scotty[source(X)].
```

https://sourceforge.net/p/chonos/examples/ci/master/tree/04-openMultiAgent/openMASExample01/ncc_1701/

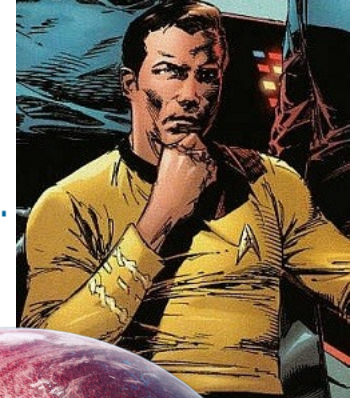
Exemplo: Bio-Inspired Protocol

```
kirk.asl  ◇ scott.asl  ◇ spock.asl

1 /* Initial beliefs and rules */
2 abroad(yes). scott("07ba9e4a-d539-4a0e-8c14-4ac336476858").
3 skyNetAddress("192.168.0.103"). skyNetPort(3273).
4 myUUID("41ff1712-b2f0-416d-8232-fef834651e77").
5 /* Initial goals */
6 !conf.
7 /* Plans */
8 +!conf : abroad(yes) & (myUUID(ID)
9   & (skyNetAddress(Server) & skyNetPort(Port))) <-
10   .connectCN(Server,Port,ID); !start.
11
12 +!conf : abroad(no) <-
13   .print("Computer, Commander James T. Kirk, Enterprise's Captain").
14
15 +!start : (abroad(yes) & energizing[source(X)]) <-
16   .print("Transporter ready!"); -energizing[source(X)]; +ready; !start.
17
18 +!start : (abroad(yes) & (ready & scott(UUID))) <-
19   -ready; -abroad(yes); +abroad(no); .moveOut(UUID,inquinism).
20
21 +!start : (abroad(yes) & scott(UUID)) <-
22   .print("Kirk to Scotty...");
23   .sendOut(UUID,tell,beam_us_up_scotty); .wait(2500); !start.
24
25 +!start : abroad(no) <-
26   .print("Computer, Commander James T. Kirk, Enterprise's Captain").
27
28 -!start <- !conf.
```

```
kirk.asl  ◇ scott.asl  ◇ spock.asl

1 /* Initial beliefs and rules */
2 abroad(yes)[source(kirk)].
3
4 /* Initial goals */
5 !start.
6
7 /* Plans */
8 +!start : abroad(no) <-
9   .wait(2000);
10   .print("Computer, Lieutenant Commander Spock, First Officer").
11
12 +!start : abroad(yes) <-
13   .wait(2000);
14   -abroad(yes);
15   .send(kirk,askOne,abroad(Status),Reply);
16   +Reply;
17   !start.
```



<https://sourceforge.net/p/chonos/examples/ci/master/tree/04-openMultiAgent/openMASExample01/andoria/>

OBRIGADO!

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