



IcSOC- Trento 2003

# An architectural pattern to extend the interaction model between Web-services

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- Conclusions & Future work

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```

# Motivation



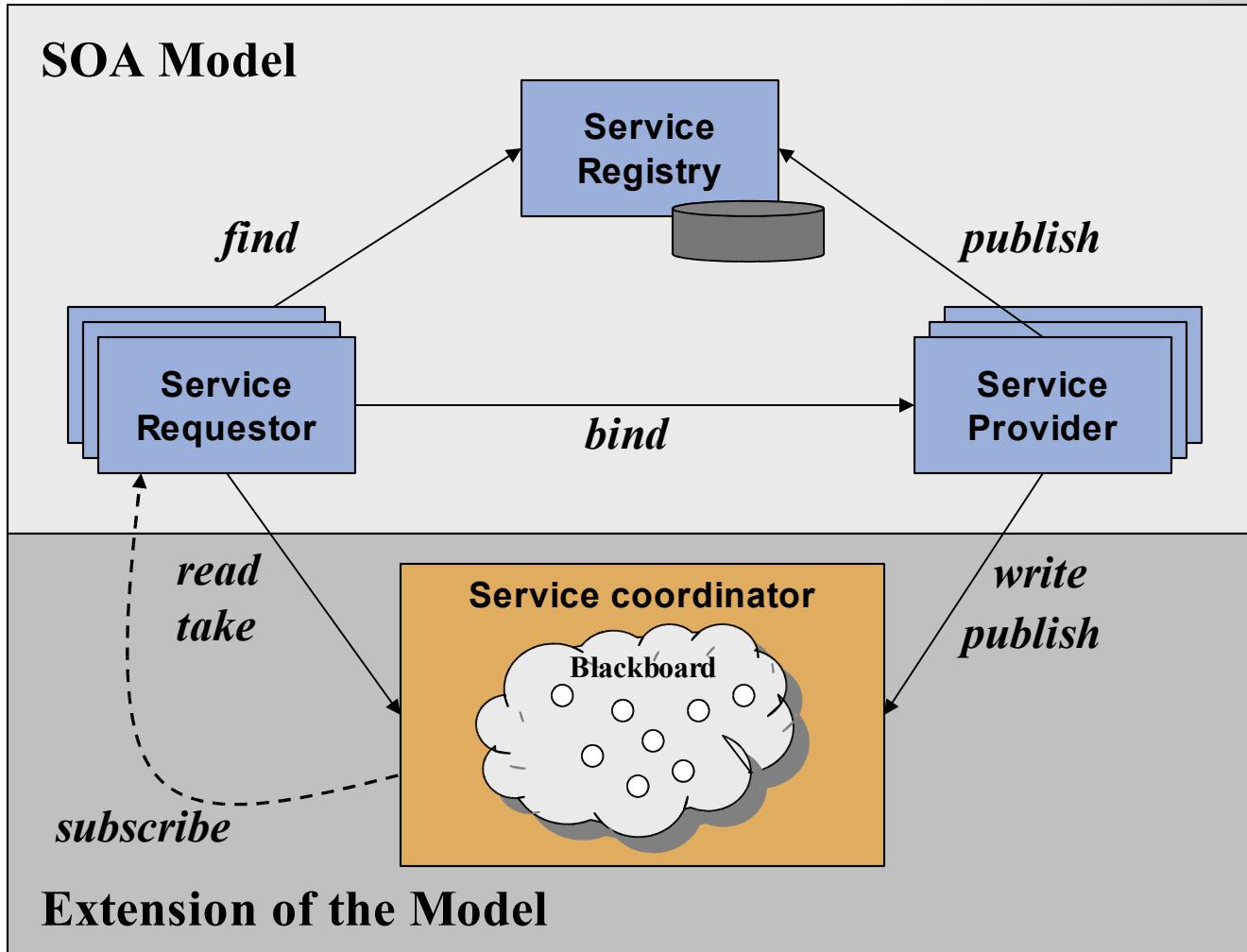
- **Integration of software applications using traditional DCP**
- **Internet as a standard middleware**
  - ❖ **Interoperability and portability between products**
  - ❖ **Ubiquitous and standard Web protocols and data formats, such as HTTP, XML and SOAP**
- **Web-service approach is the most promising way to facilitate application integration through Internet**

# Motivation



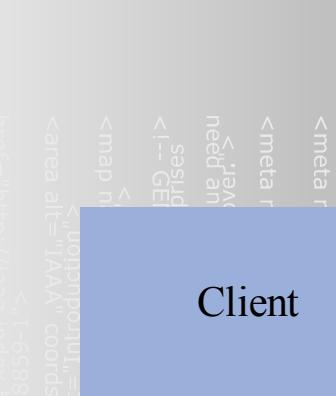
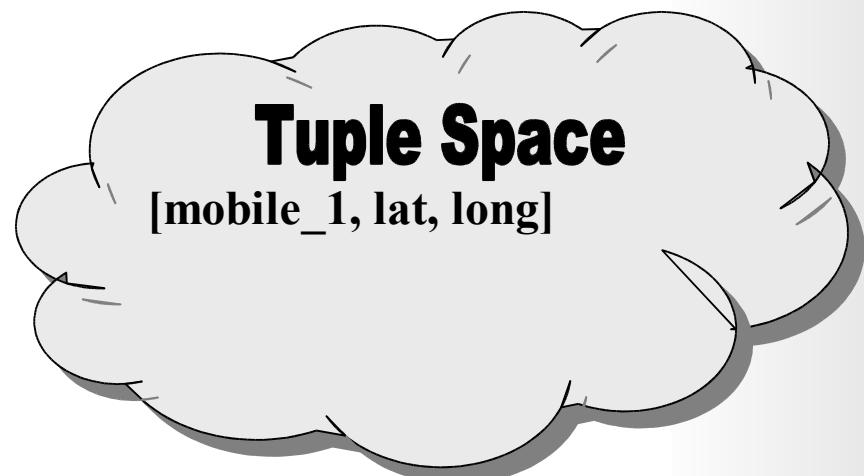
- ❑ **Highly dynamic application-contexts require new interaction models between Web-services (many-to-many, asynchronous, reactive, etc.)**
  - ❑ **To avoid ad-hoc composition solutions (hardly reusable solutions, coupled and cohesive services, etc.)**
  - ❑ **Search for architectural solution based on design patterns and coordination models**

# An extension of the SOA model



# The Linda model

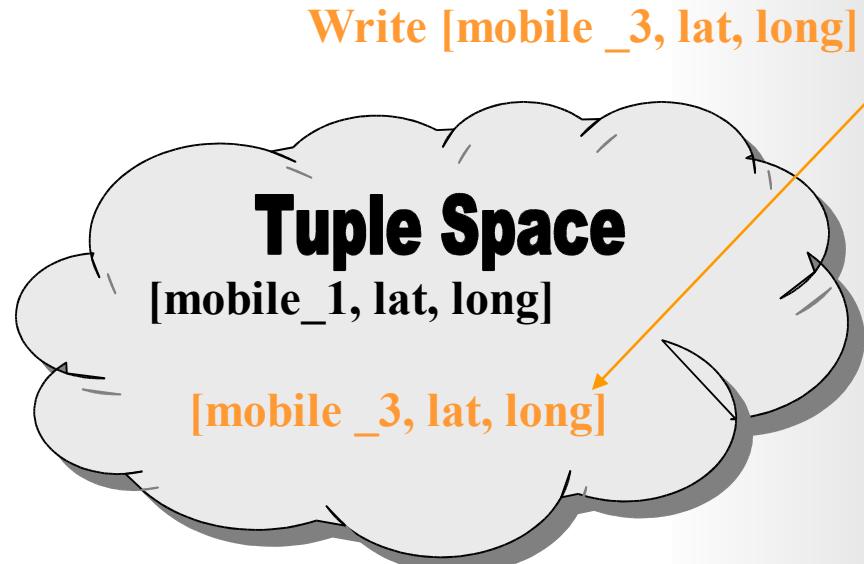
## □ Generative Communication



```
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<meta name="Description" content="Descripción de la página" />
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```

# The Linda model

## □ Generative Communication

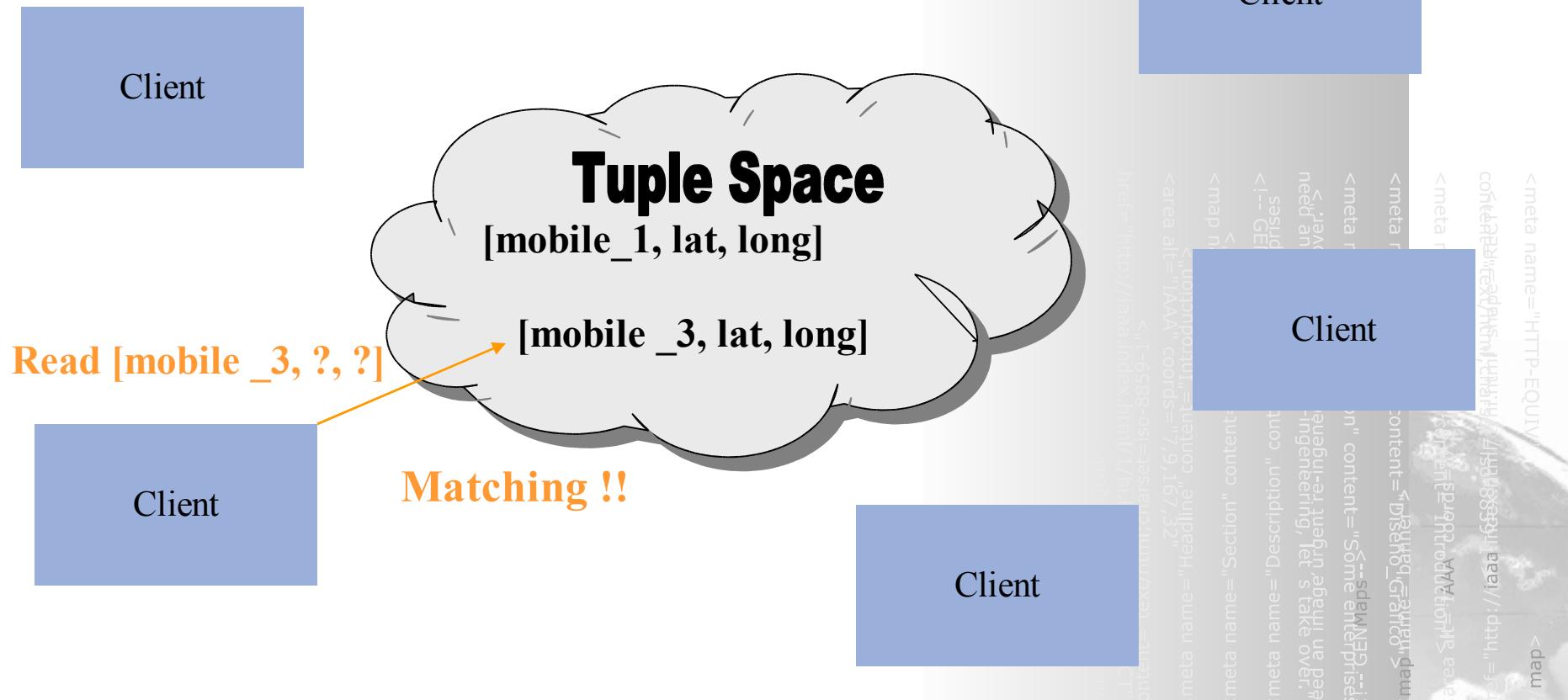


```
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<meta name="Section" content="Conclusiones" />
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```

# The Linda model

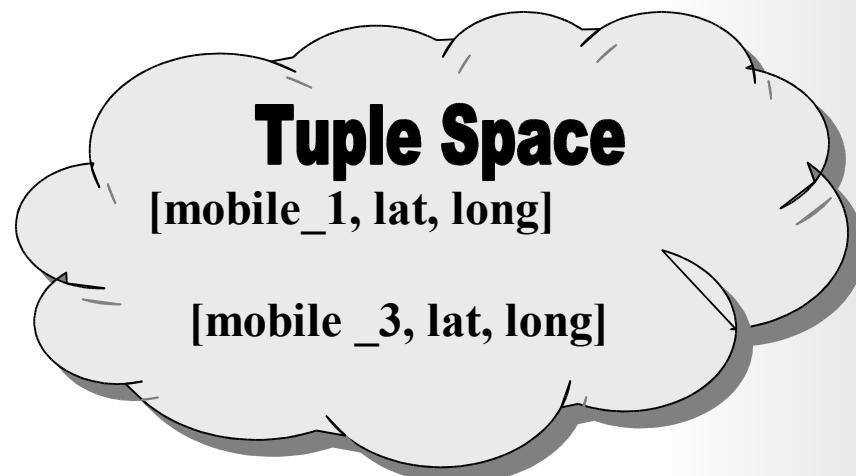


# Generative Communication



# The Linda model

## □ Generative Communication



[mobile \_3, lat, long]



```
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<area alt="AAA" coords="7,9,167,35" href="http://www.linda.com/Linda.html" type="image/png">
```

HTTP-EQUIV="refresh;3;url=http://www.linda.com"

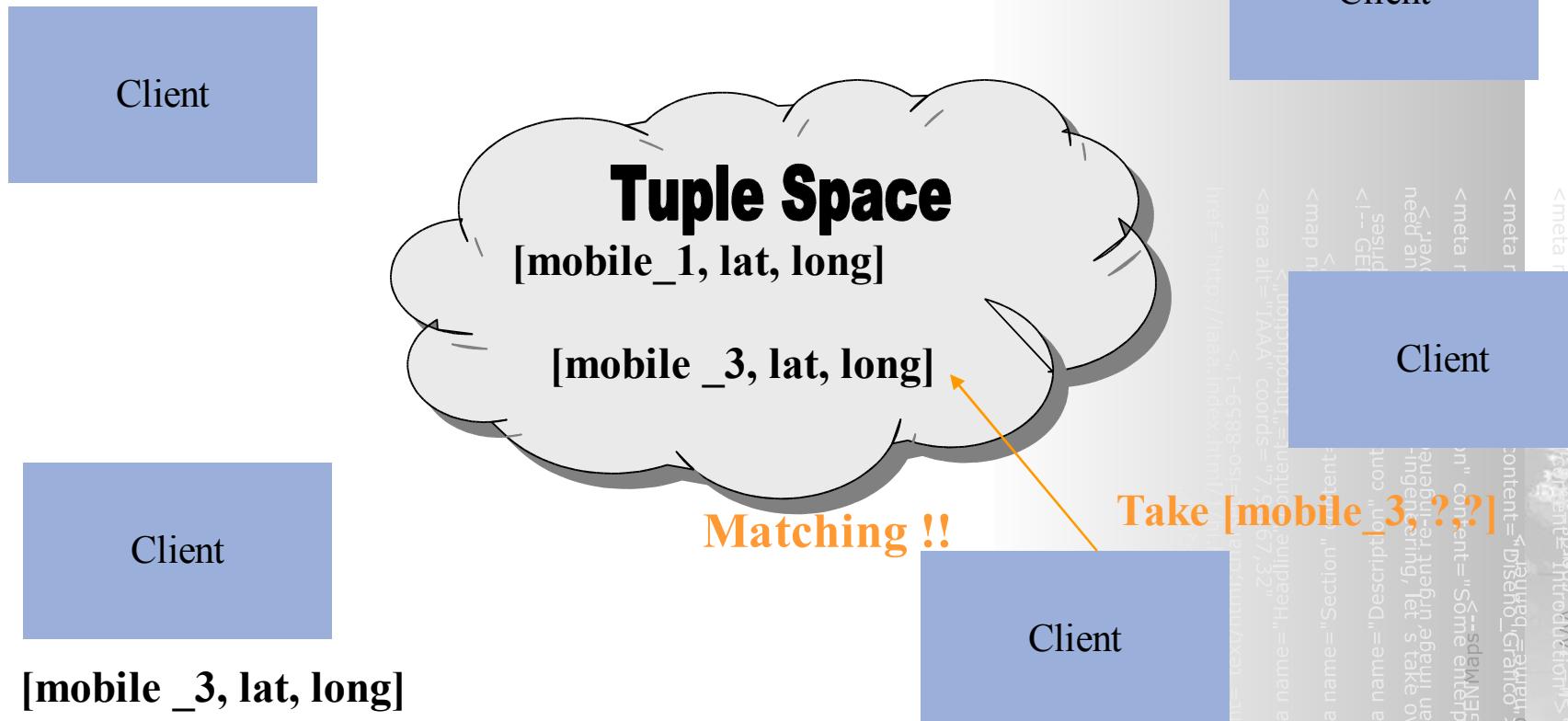
area alt="AAA" coords="7,9,167,35" href="http://www.linda.com/Linda.html" type="image/png"

9

# The Linda model



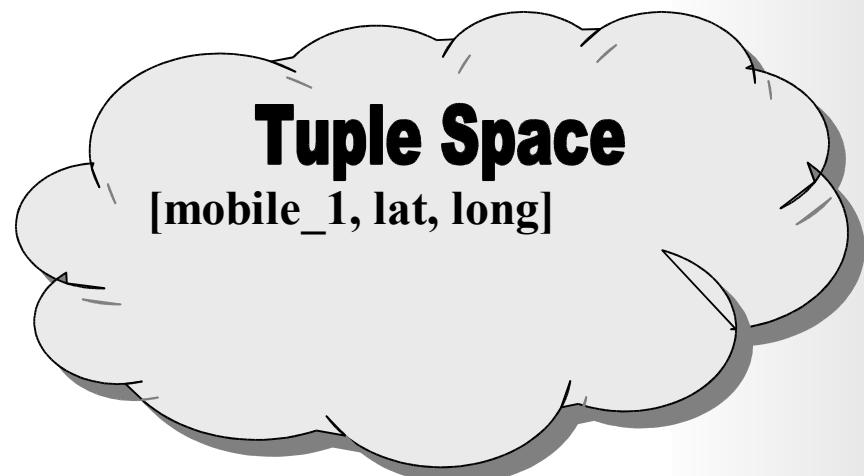
# Generative Communication



[mobile \_3, lat, long]

# The Linda model

## □ Generative Communication



[mobile \_3, lat, long]

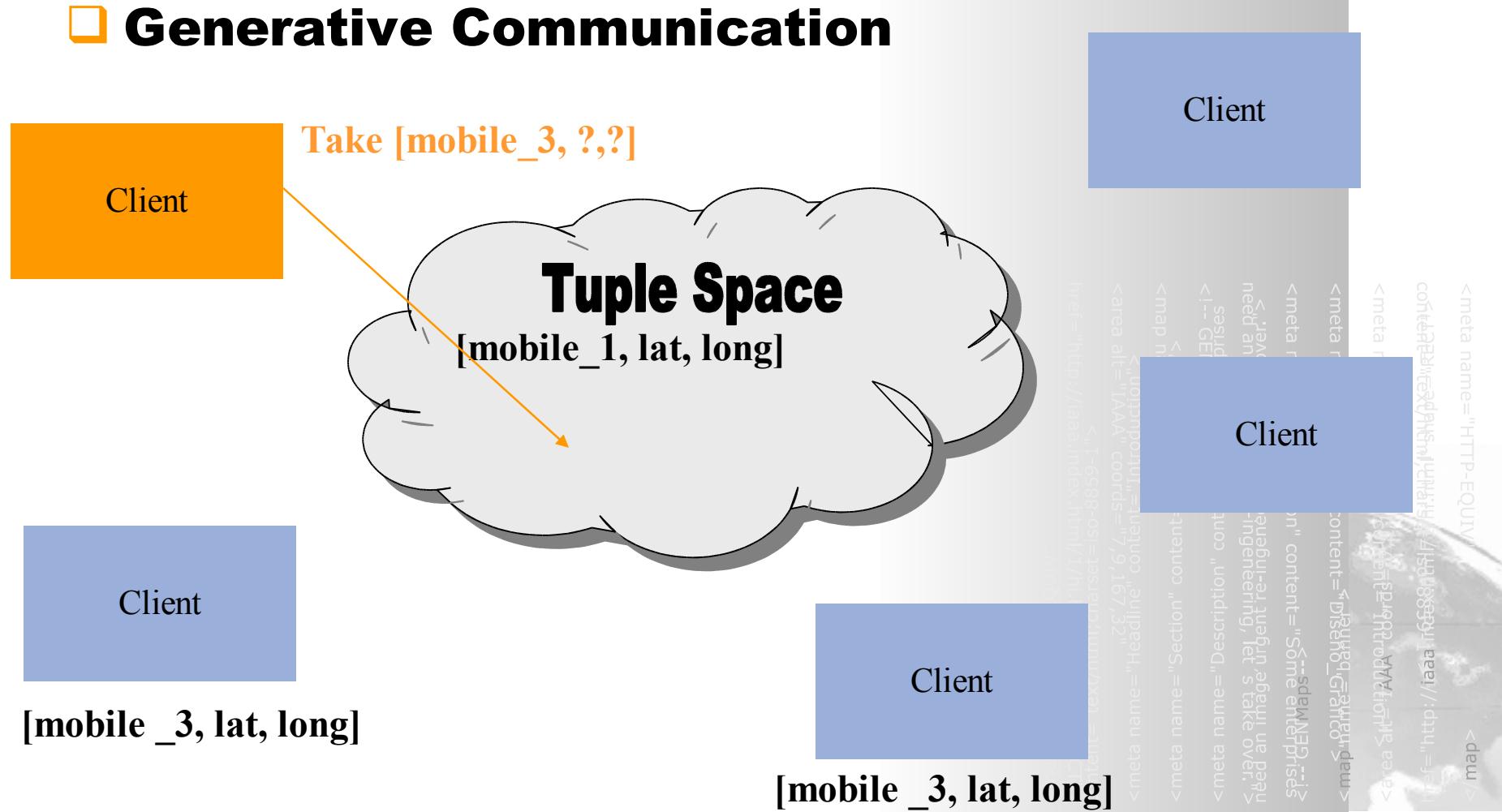


[mobile \_3, lat, long]



```
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```

## The Linda model

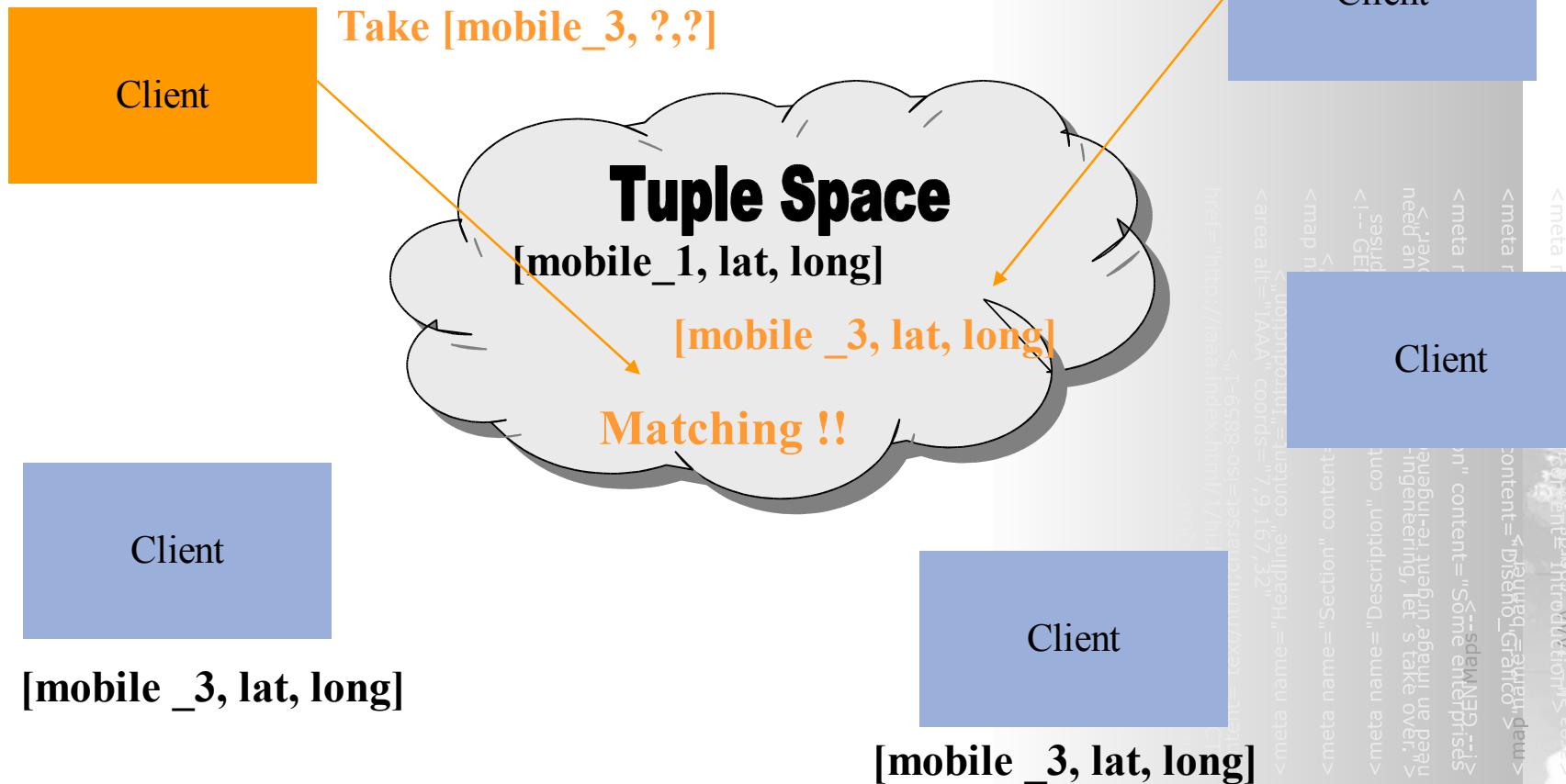


# The Linda model

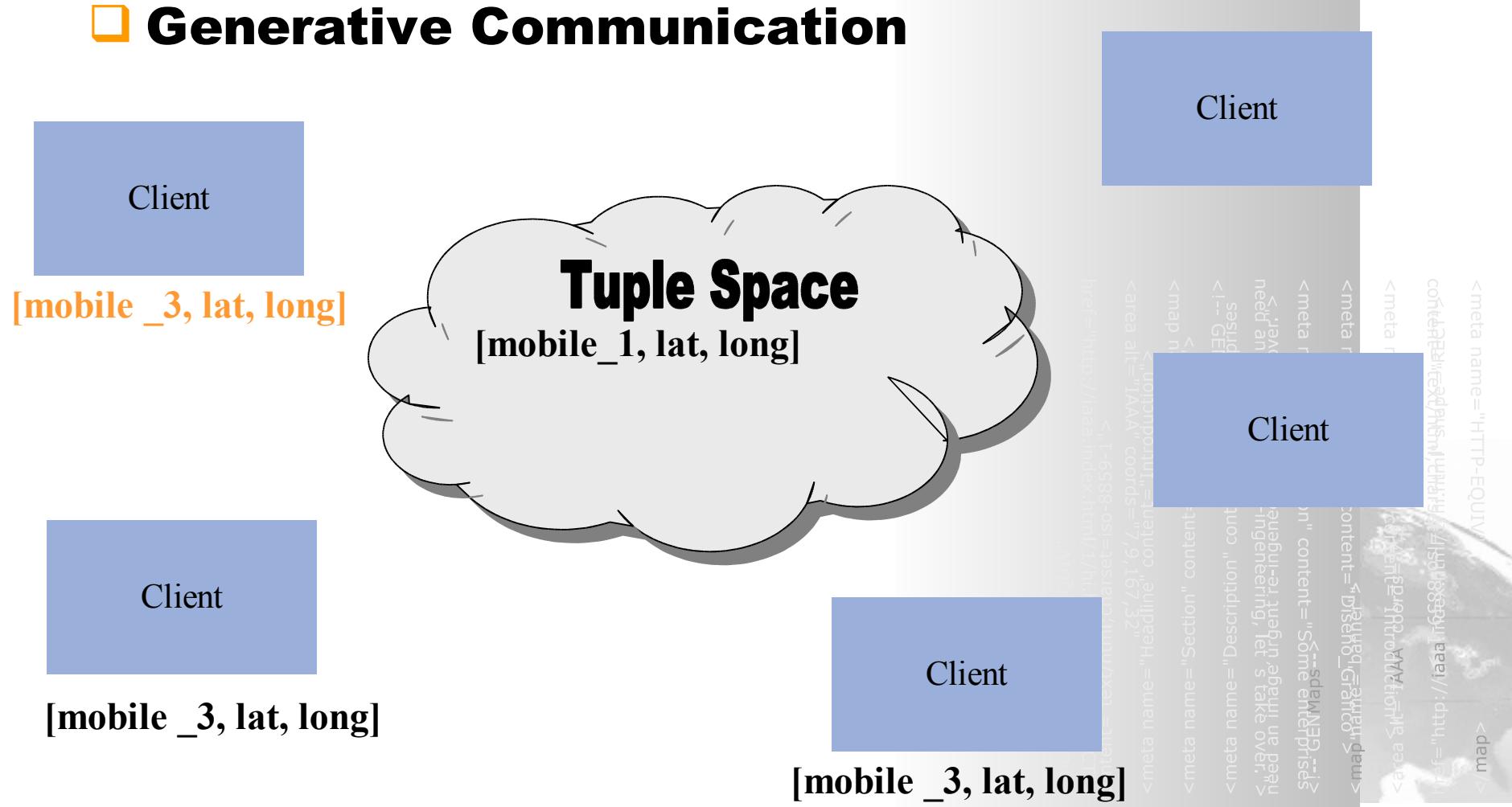


# Generative Communication

## Write [mobile \_3, lat, long]



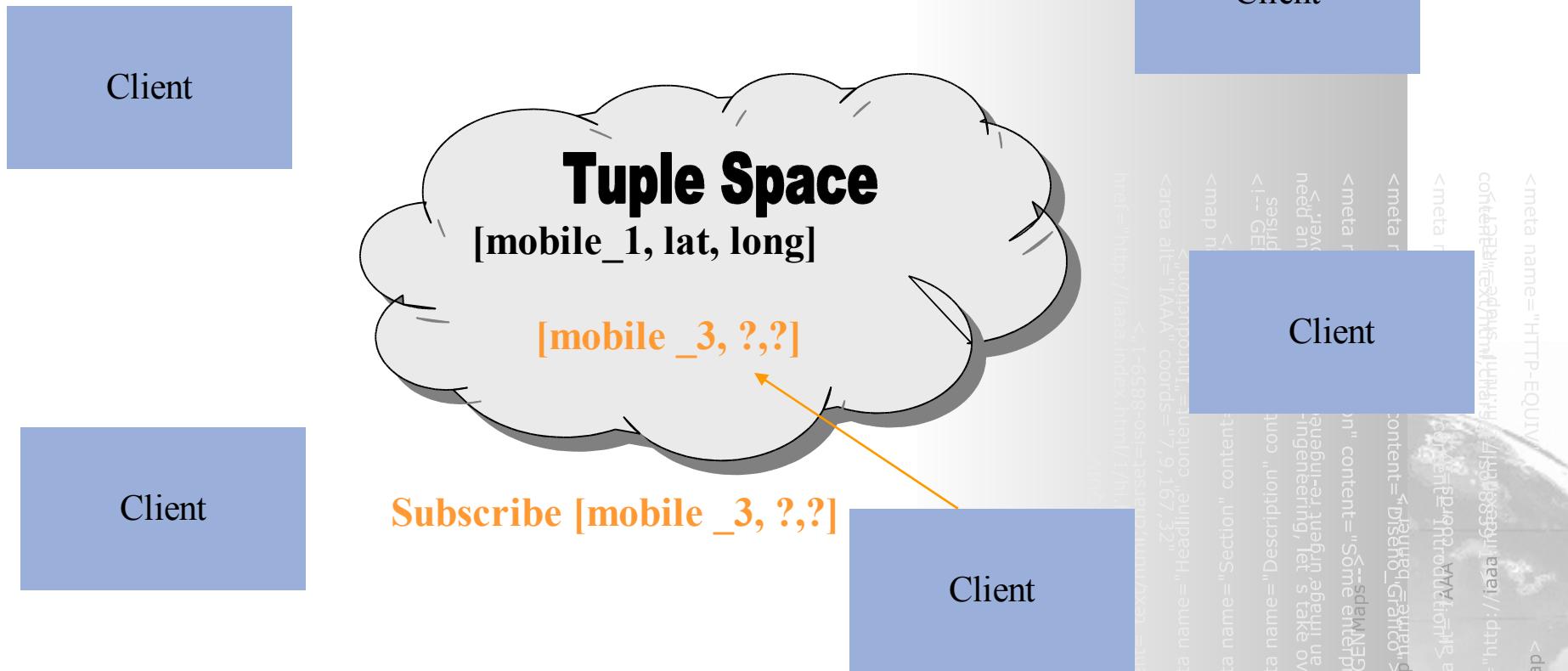
# The Linda model



# An extension of the Linda model

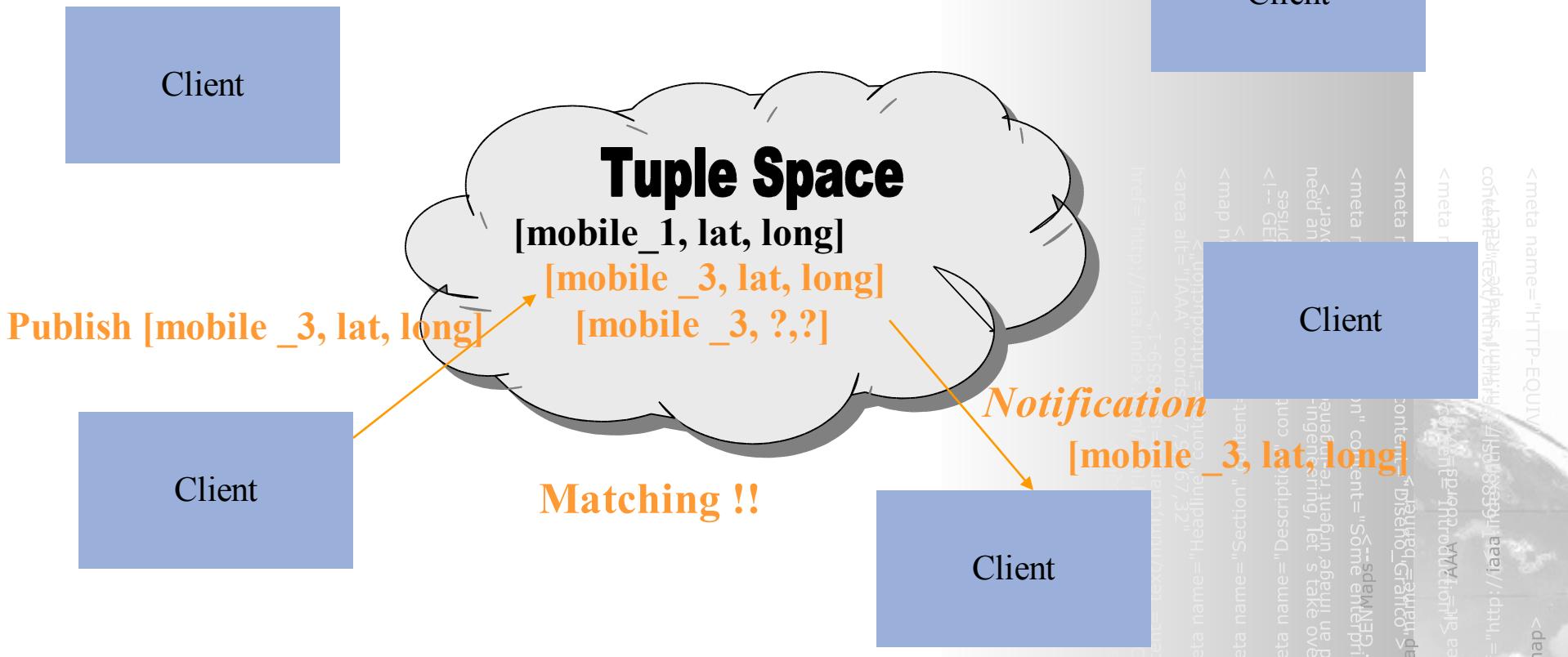


## Incorporating reactive behaviour



# An extension of the Linda model

## □ Incorporating reactive behaviour



# An extension of the Linda model



# Incorporating XML Data

## Client

## Client

# Tuple Space

[(**id**,vehículo1), (**lat**,41.4323), (**long**,0.8323)]

```
<pos>
  <id> vehículo1 </id>
  <lat> 41.4323 </lat>
  <long> 0.8323 </long>
</pos>
```

Client

lient

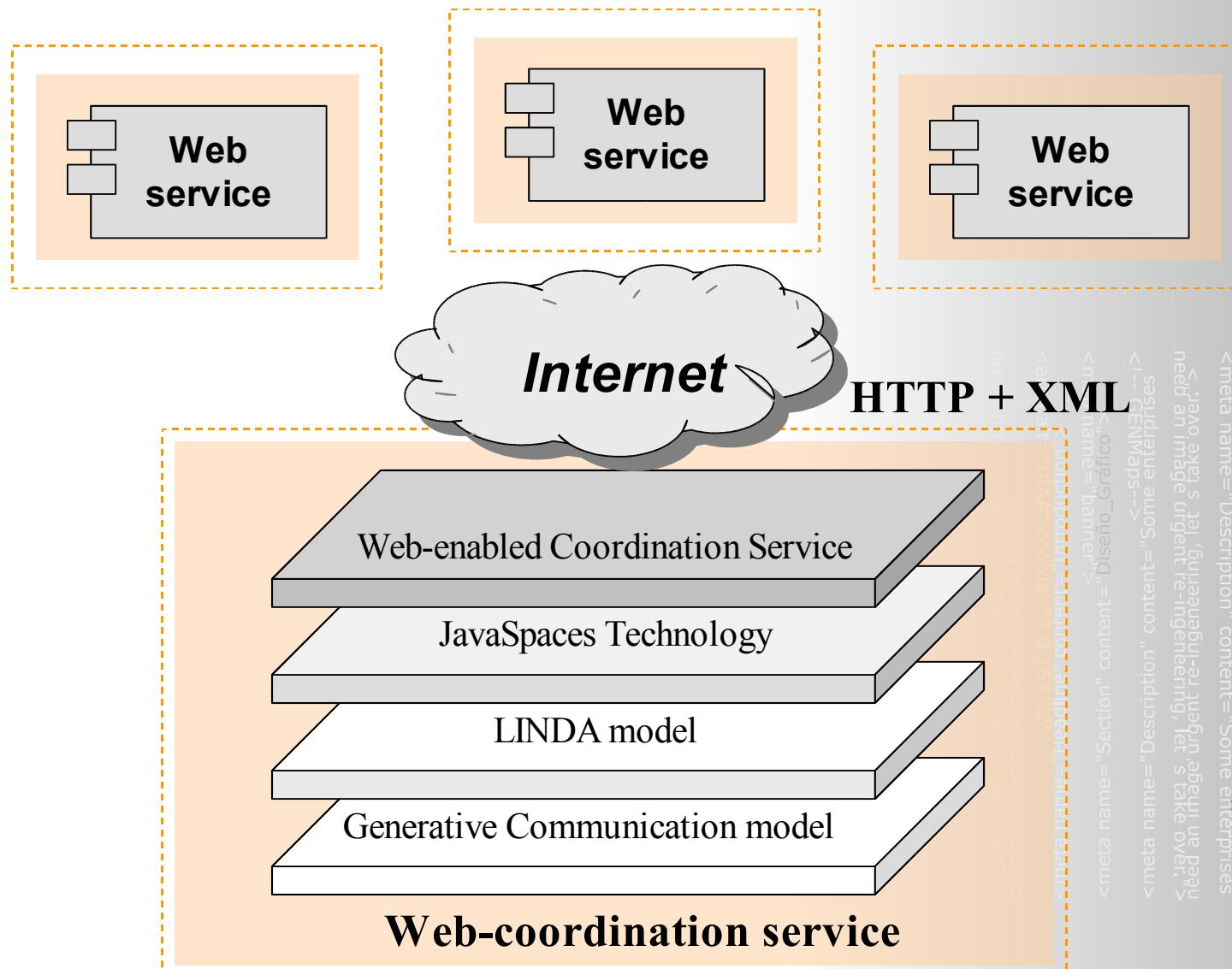
## Client

# Why the extended Linda model?

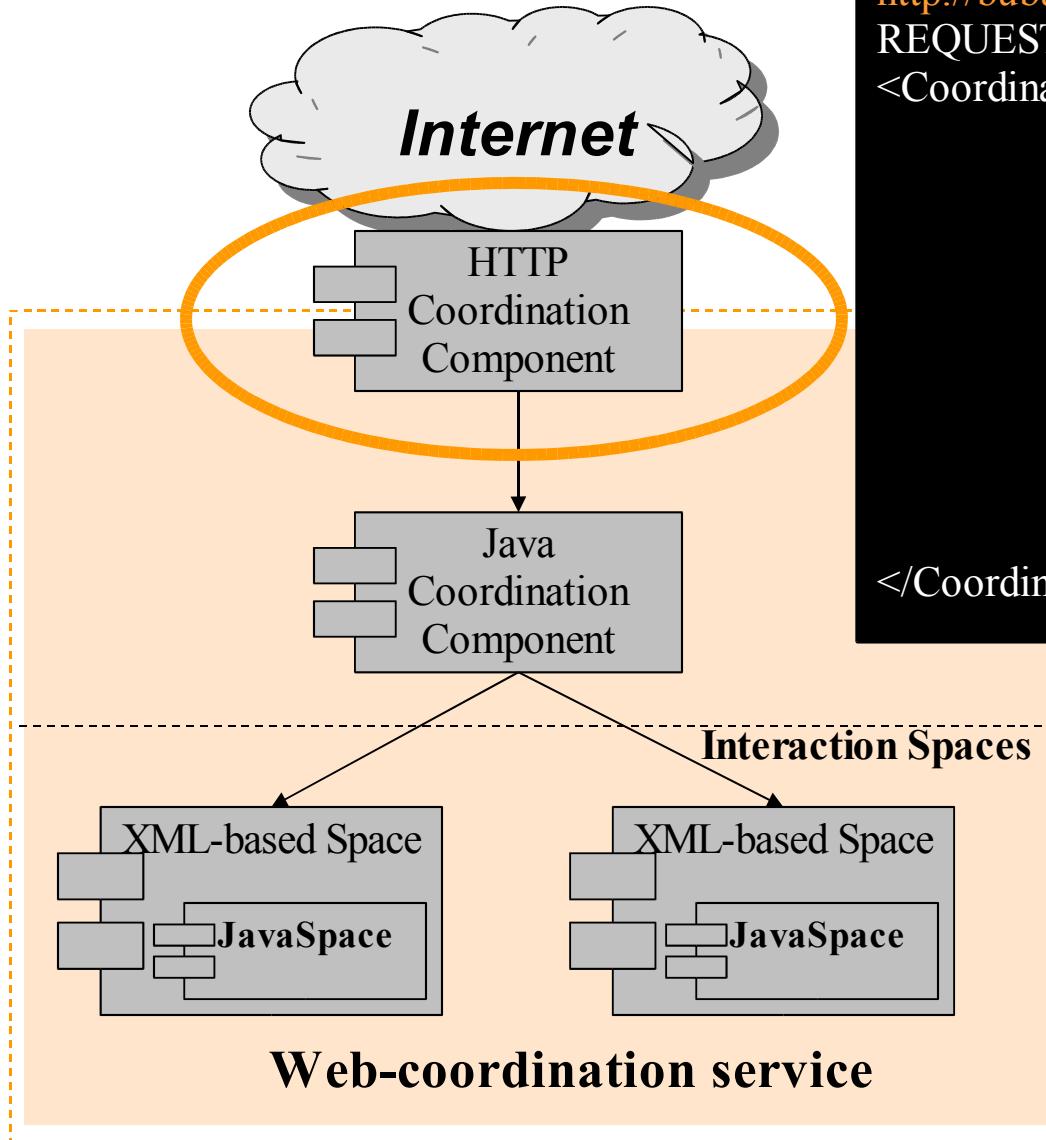


- **Support the required interaction models**
- **Processes distributed in space to cooperate distributed in time**
- **The shared knowledge between different distributed processes is minimum (common vocabularies)**
- **Processes can be replaced or added without adapting or announcing other processes**
- **An opportunistic strategy to solve problems (adequate to solve location-data adquisition problems in the LBS context)**

# Web-Coordination service



# Web-Coordination service



```
http://bubu.cps.unizar.es/CoordinationServlet?  
REQUEST=<?xml version="1.0"?>  
<CoordinationService>  
    <operation>write</operation>  
    <tuple>  
        <Location>  
            <id> vehículo1 </id>  
            <lat> 41.4323 </lat>  
            <long> 0.8323 </long>  
        </Location>  
    </tuple>  
</CoordinationService>
```

3

<meta name="HTTP-EQUIV" content="Refresh:0; URL=http://j2ee.cps.unizar.es/CoordinationServlet?REQUEST=write&location=7,9,167,32">

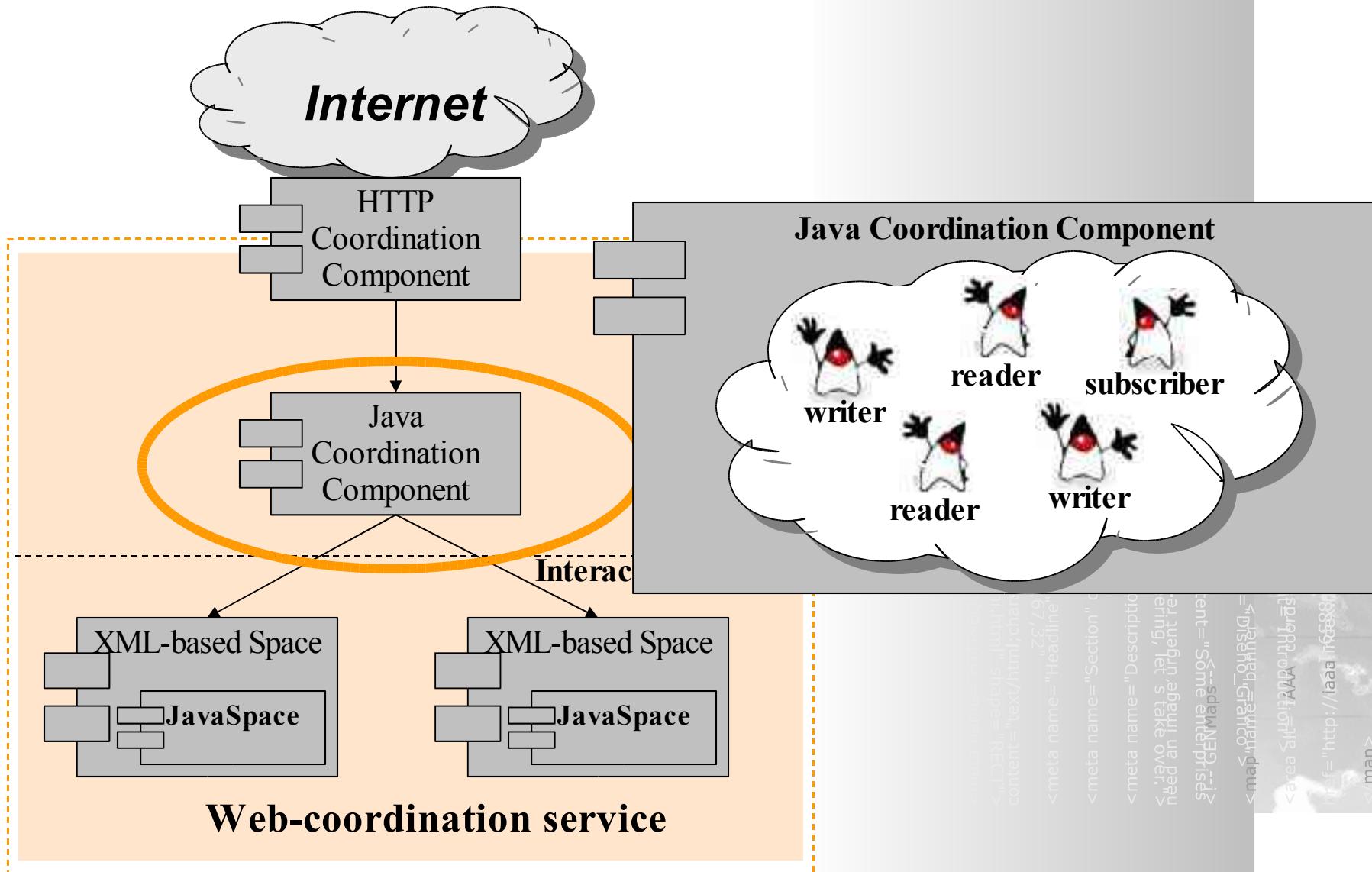
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<title>CoordinationServlet</title>

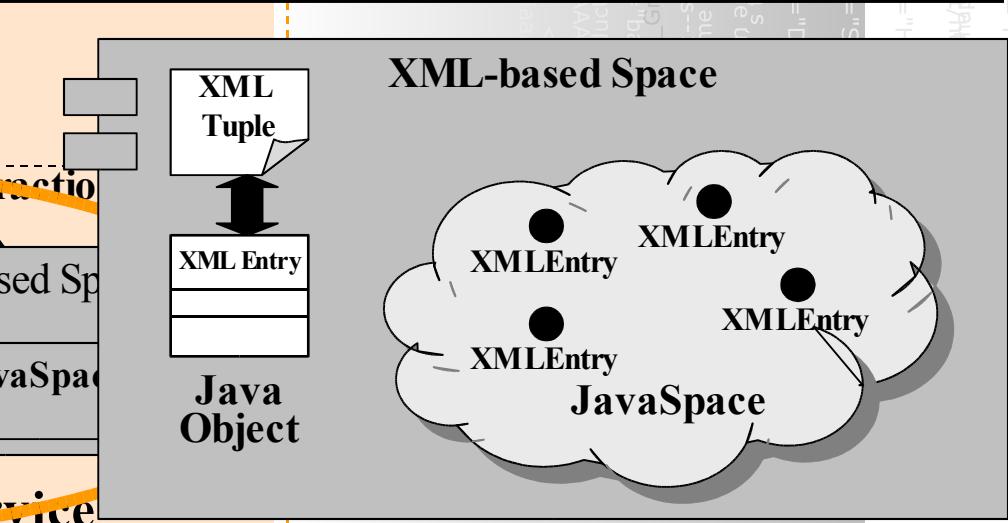
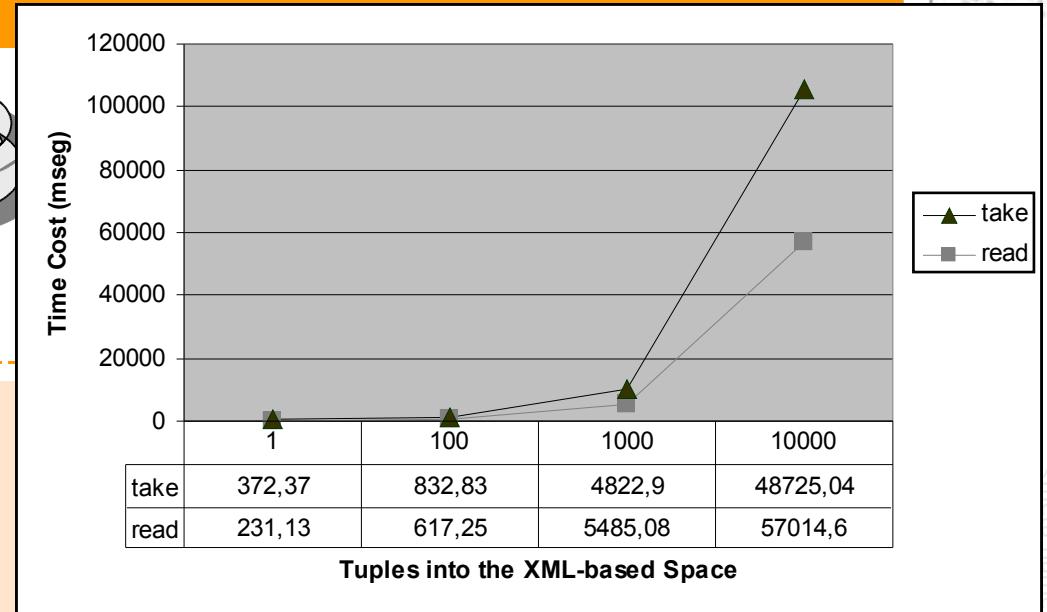
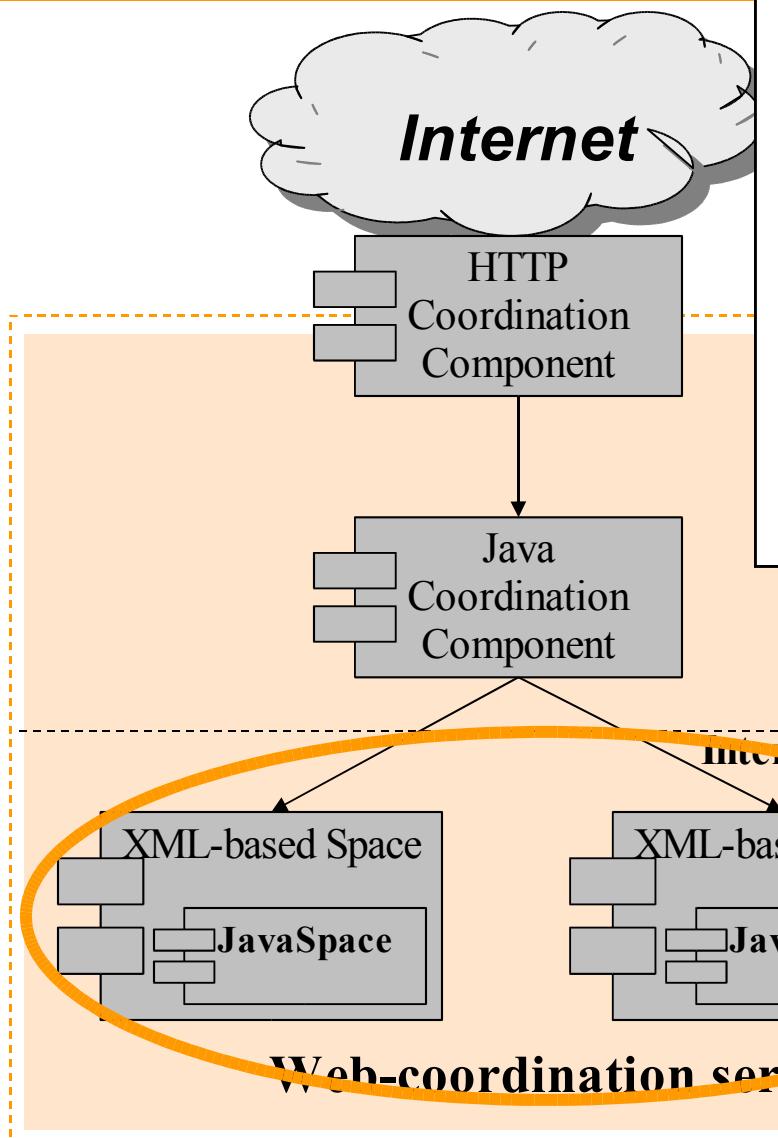
<body>

<pre><?xml version="1.0"?><CoordinationService><operation>write</operation><tuple><Location><id> vehículo1 </id><lat> 41.4323 </lat><long> 0.8323 </long></Location></tuple></CoordinationService></pre>

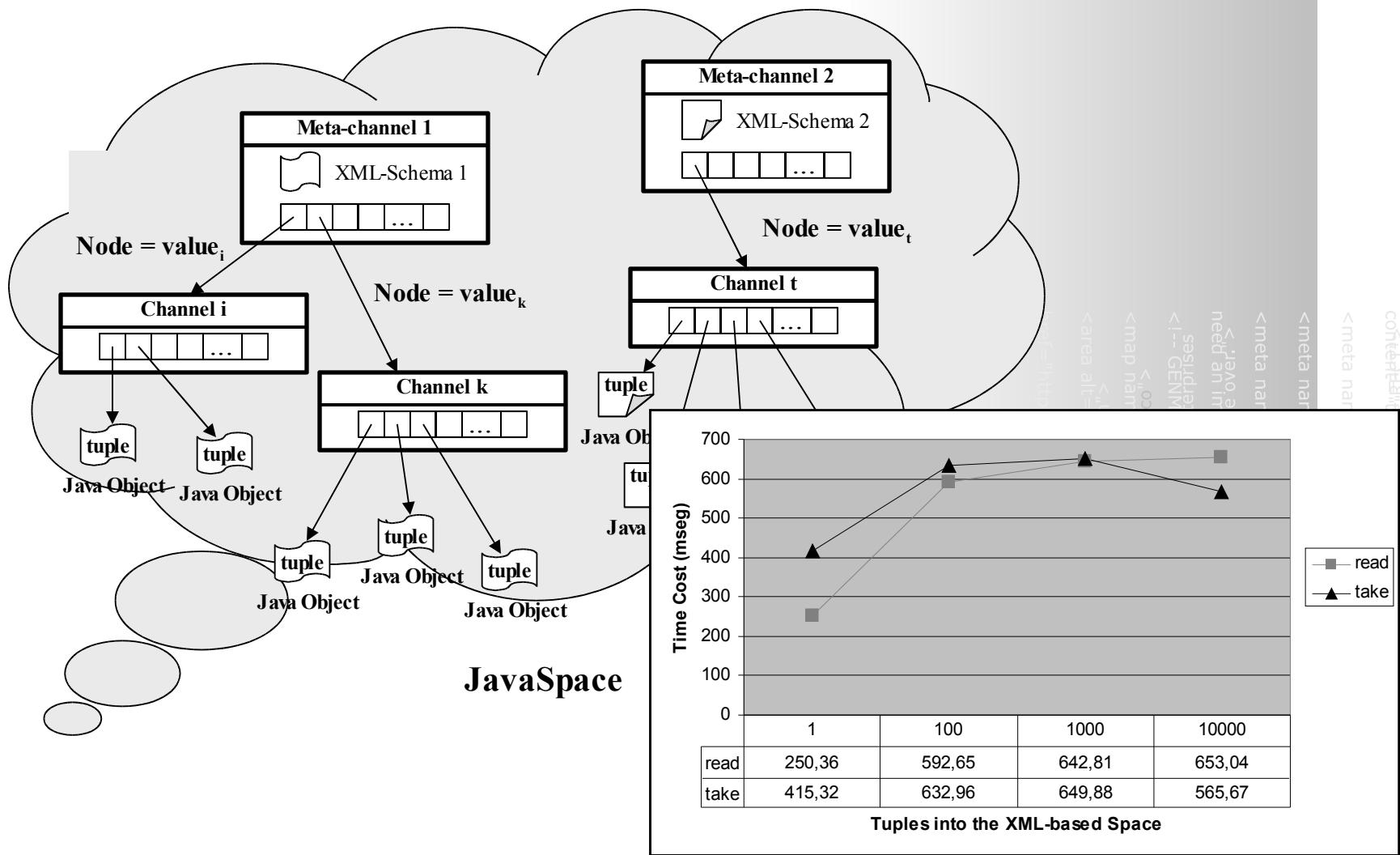
# Web-Coordination service



# Web-Coordination service



# Optimizing the XML-Space



# Conclusions



## Extension SOA model to solve interaction problems

- ❖ **Asynchronous & reactive interactions based on the use of HTTP & XML**
  - ❖ **Space and time uncoupling interactions**
  - ❖ **More dynamic Web-service environments**

## A Web-coordination service

- ❖ **Based on JavaSpaces**
  - ❖ **Communication patterns to improve its efficiency**

# Future work

- To discover the real potential of the XML language to express synchronization restrictions and workflows among services
- To improve the matching functions of the coordination space to support semantic interoperability





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