xOperator

Interconnecting the Semantic Web and Instant Messaging Networks

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- Application Context and Idea
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Semantic Web: Current Problems

- A clear lack of simple to use end user applications
  - (1) Difficult to **hide technical details**
- Huge amount of resources
  - (2) **Provenance and trust** of resources?
  - (3) **Context awareness** of queries?

Instant Messaging (IM)

- **> 1000 Mio users** (among different providers)
- One of the **most popular internet service**

- An **omnipresent** interface
- A trusted social **network**

xOperator = IM + Semantic Web

- Interconnect Instant Messaging Networks with the Semantic Web
- Use Instant Messaging Clients

  as a widely used interface

  to query the users resources
- Use the inherent social network

  to achieve a trust in resources

  to achieve context awareness of the queries

Talk to the Semantic Web

Talk to the Semantic Web

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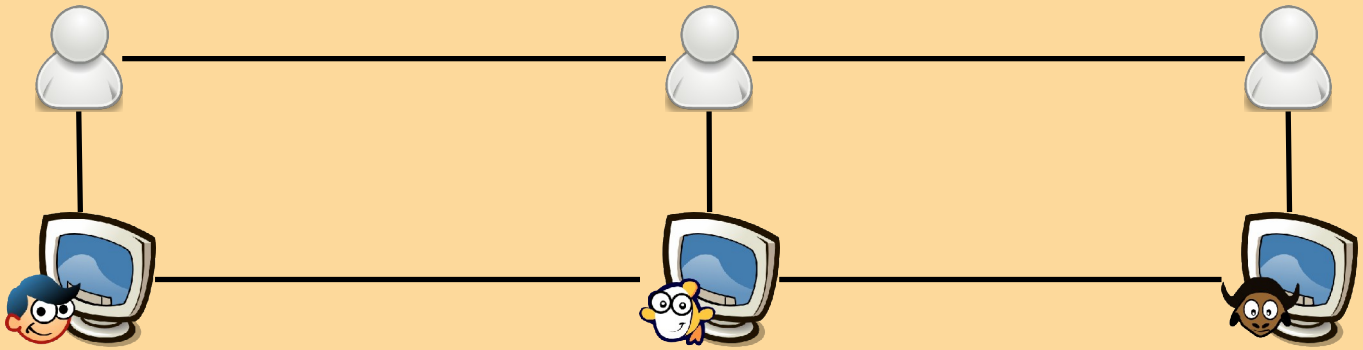
Talk to the Semantic Web

Application Context and Idea

- Build an agent **overlay network** inside the IM network



Application Context and Idea

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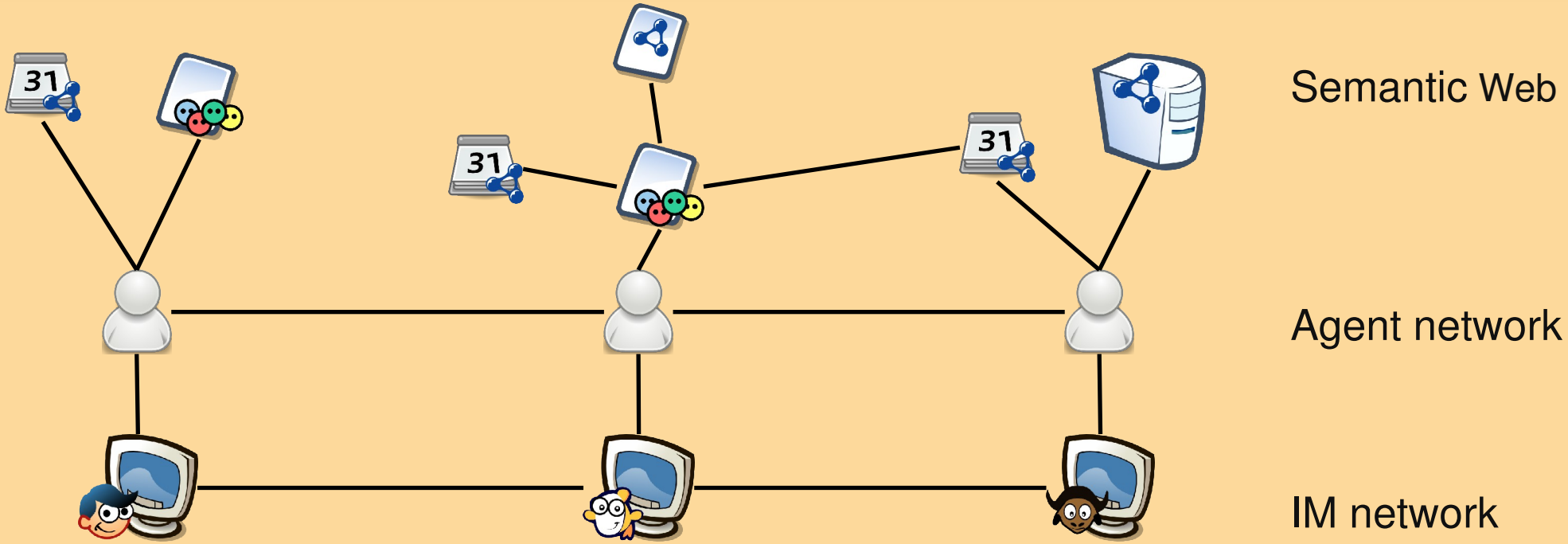
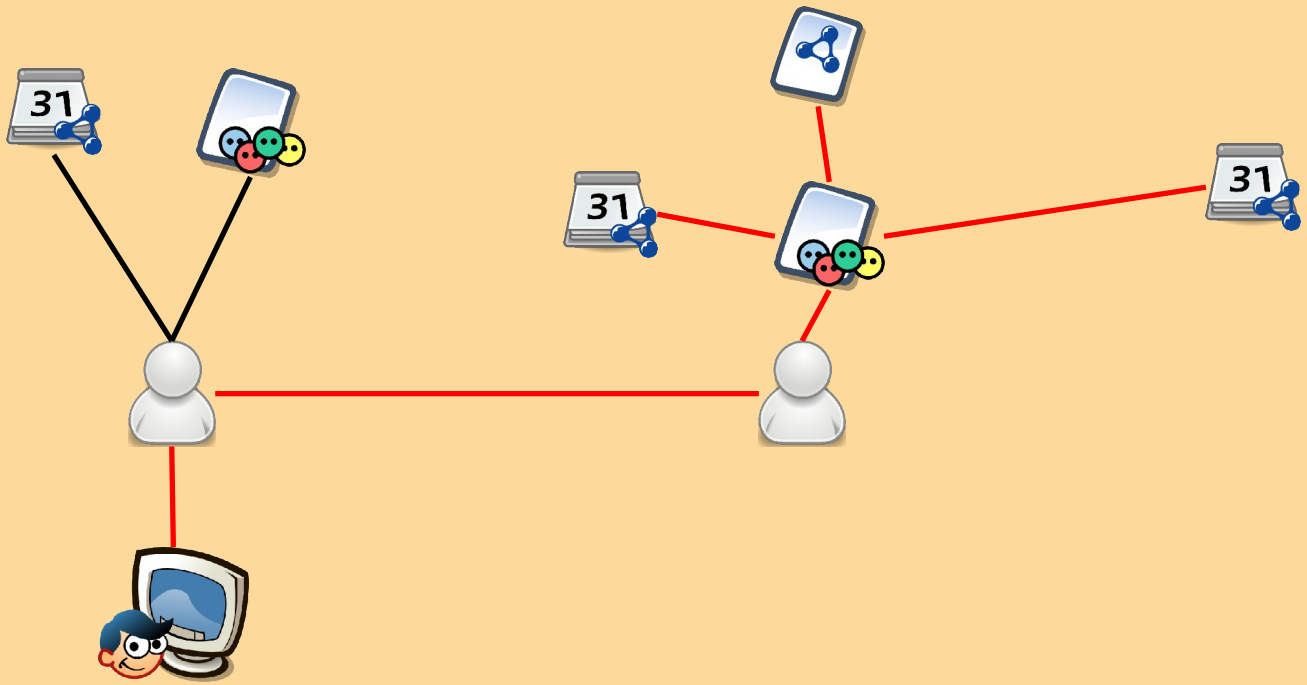
- Agents are equipped with **trusted resources**



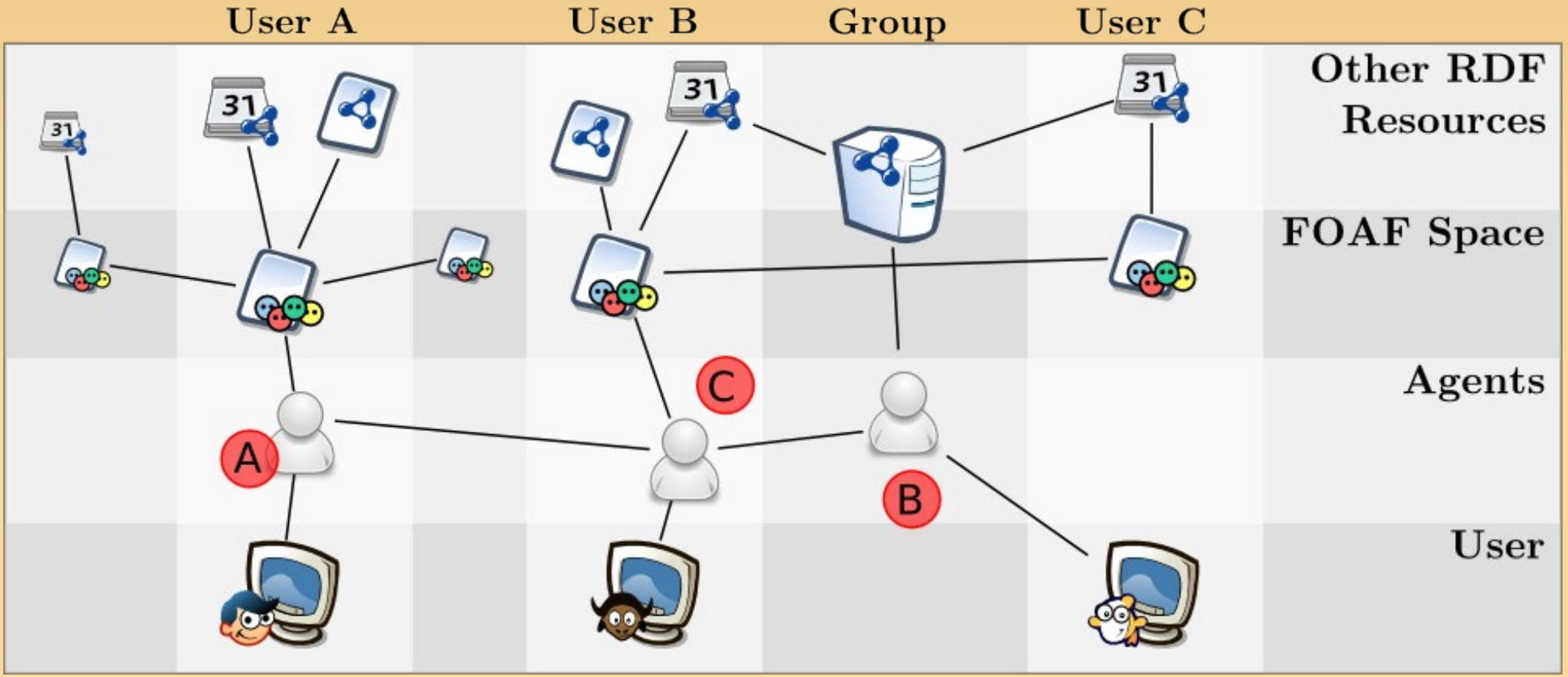
Application Context and Idea

- Build an agent **overlay network** inside the IM network
- Agents are equipped with **trusted resources**
- Queries are routed to **friend agents**

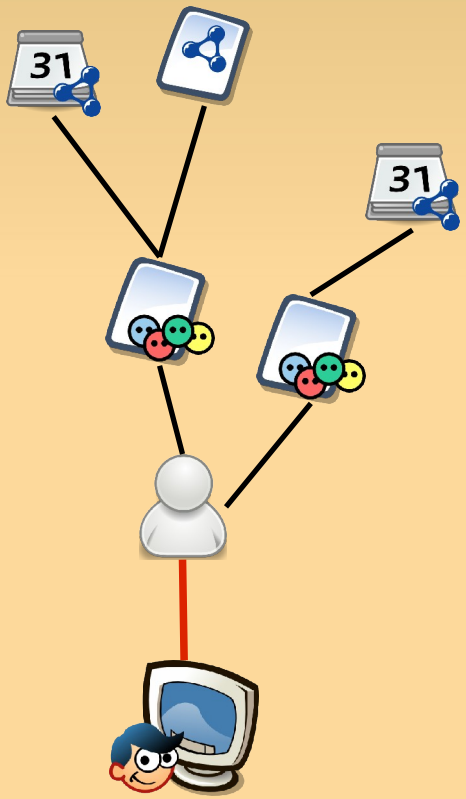


Communication Scenarios

(A) Personal Agent - (B) Group Agent - (C) Agent Network

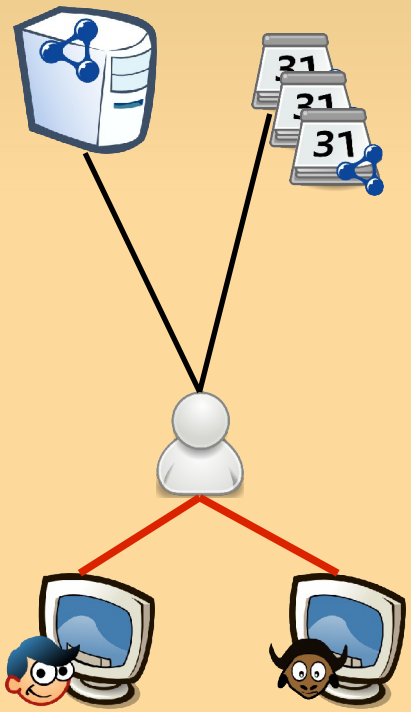


Personal Agent



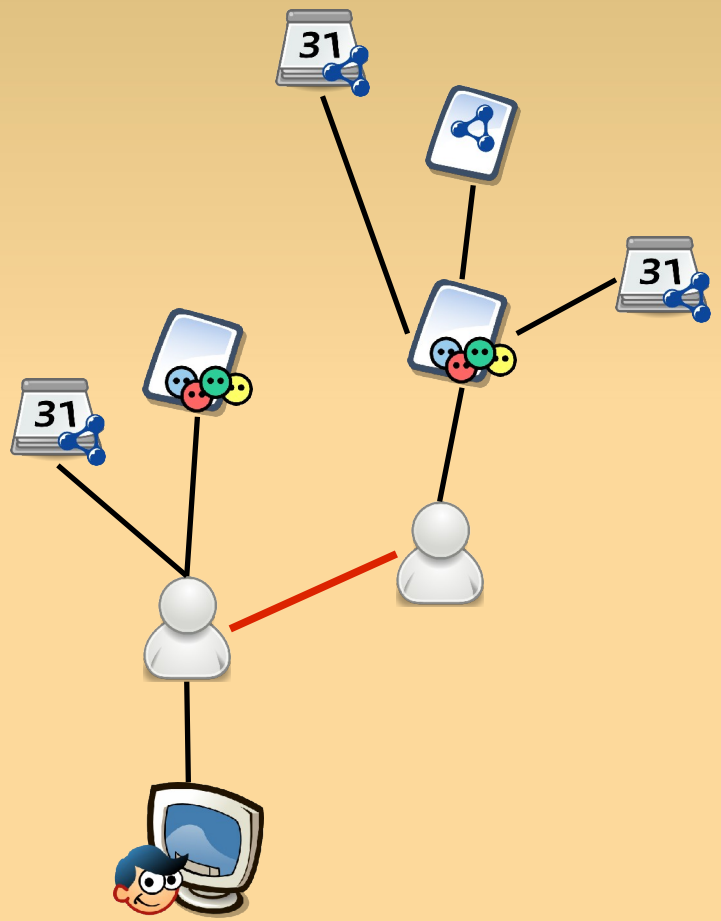
- Access to your trusted RDF data
  - Your own FOAF profile
  - Your friends FOAF profile
  - RDF calendars

Group Agent



- Agent permits more than one user
- Access to the group resources
  - Company directory
  - Group calendar
  - Semantic wiki

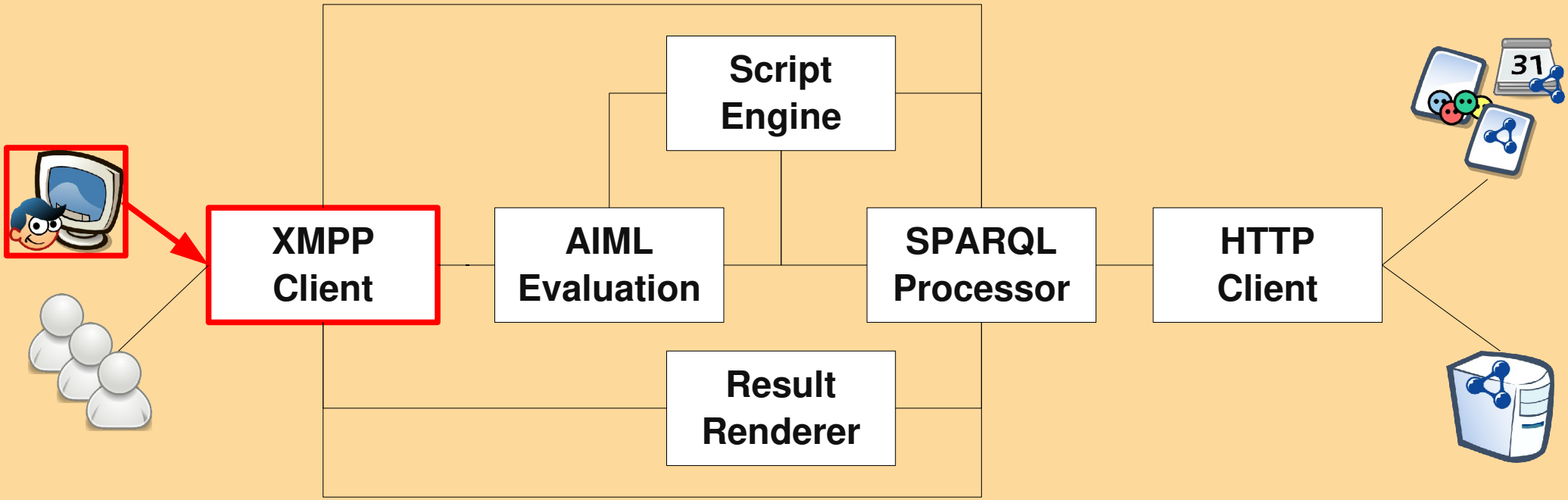
Agent Network



- Agents communicate with their **neighboring agents**
  - SPARQL over XMPP
  - Neighbourhood = Agents which are owned by a friend (using the **IM roster**)

Technical Architecture

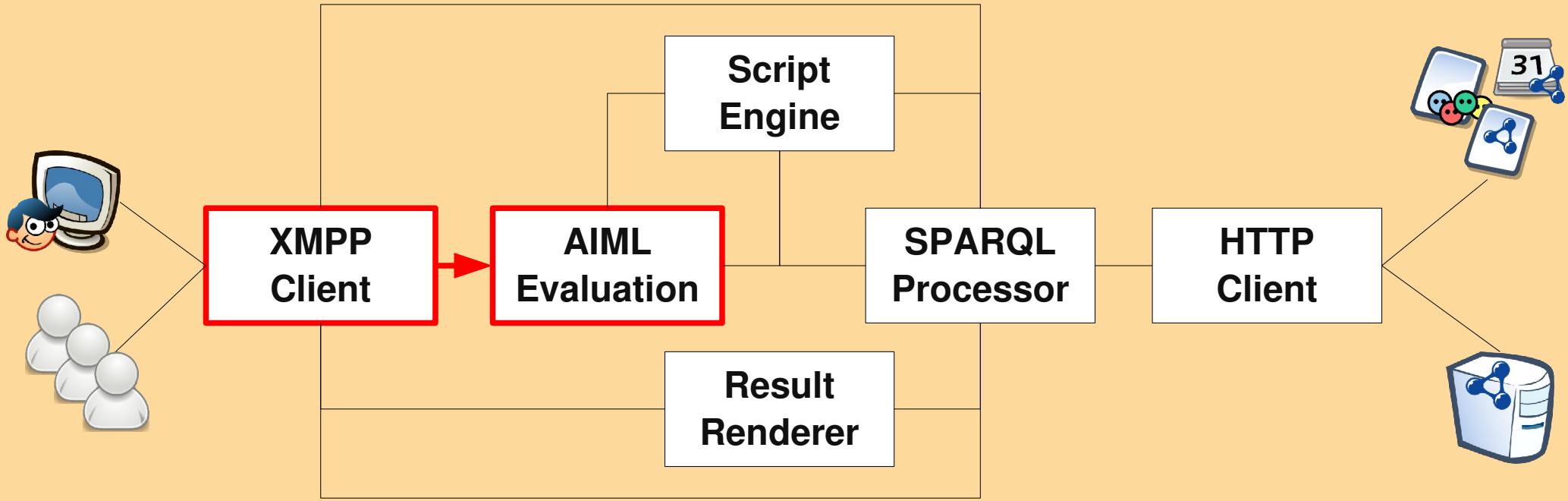
- User types a chat message to her agent



Technical Architecture

- Message processing

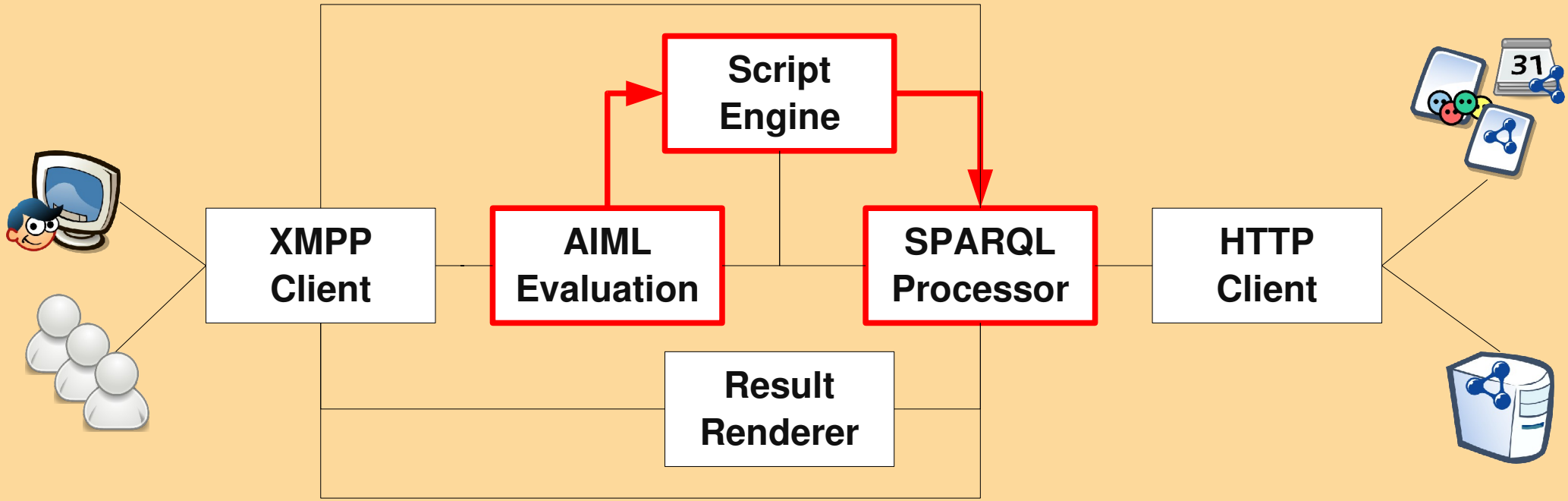
  string substitutions, stop word filtering



Technical Architecture

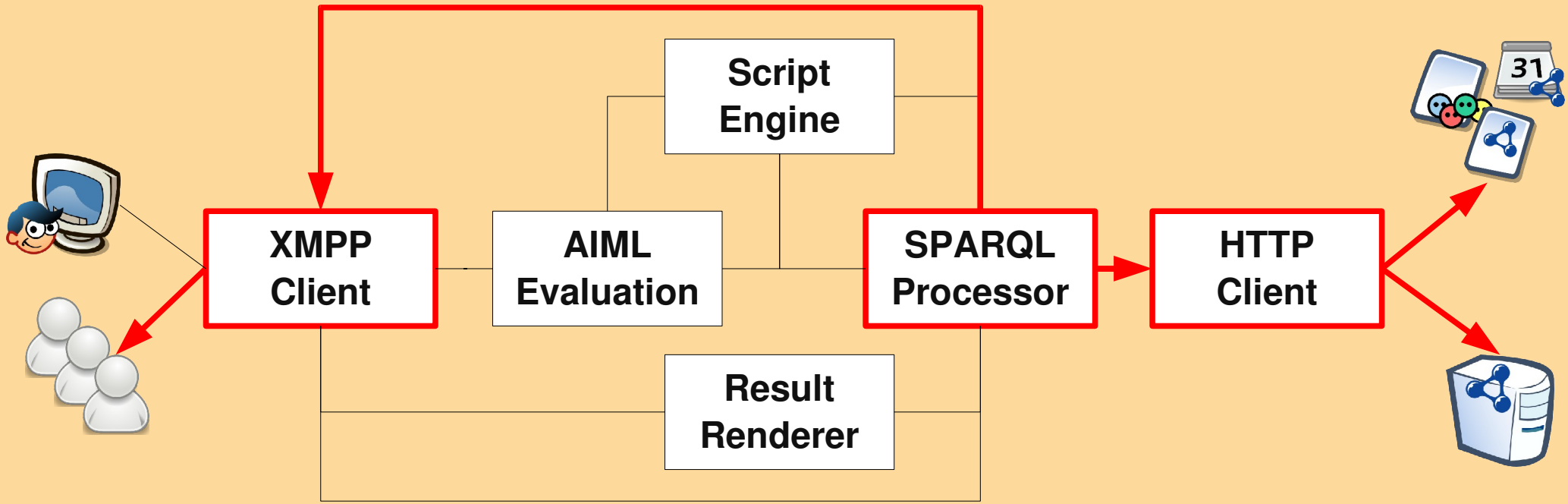
- Query script execution

  Parameter manipulation, endpoint filtering, query chaining, ...



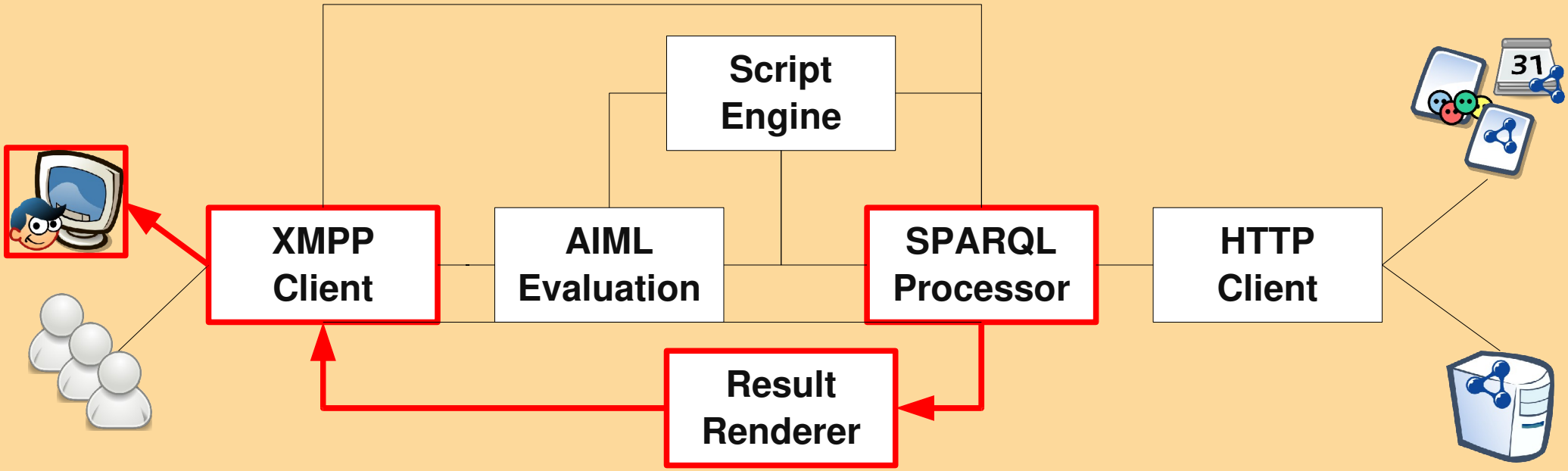
Technical Architecture

- Query distribution and execution
  - Local endpoint, distributed endpoints, documents
  - Agent communication as special XMPP queries



Technical Architecture

- Rendering of SPARQL results
- Return message to the user



Query Method: Template Based

User input is matched with a **single** SPARQL query

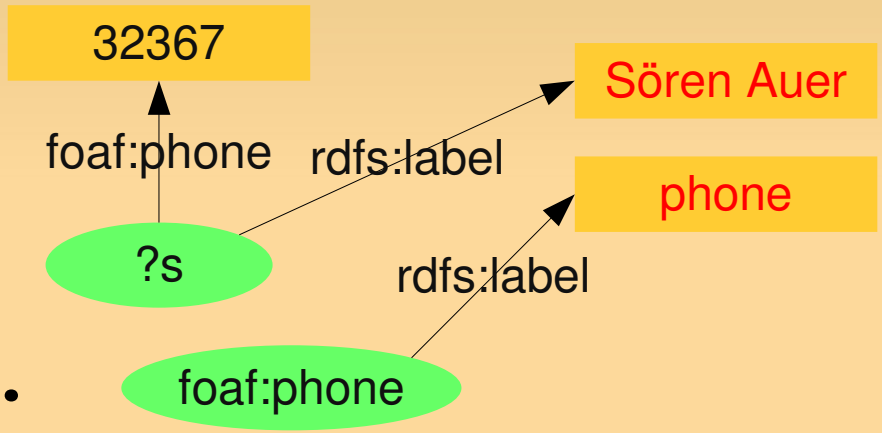
Tell me the phone of sören

```
<category>
   <pattern>TELL ME THE * OF *</pattern>
   <template>
        <external name="query" param="SELECT ..." />
   </template>
</category>
```

Query Method: Template Based

User input is matched with a **single** SPARQL query

Tell me the phone of sören




```
SELECT ?value WHERE {
 ?s     rdfs:label ?spattern.
 ?s     ?prop      ?value.
 ?prop rdfs:label ?ppattern.
 FILTER regex(?spattern, '.*sören.*', 'i')
 FILTER regex(?ppattern, '.*phone.*', 'i')}
```

Query Method: Script Based

User input is matched with a **Groovy Script**

where is sören now

```
<category>
   <pattern>WHERE IS * NOW</pattern>
   <template>
        <external name="groovy"
           param="iCalWhereNow.groovy" />
   </template>
</category>
```

Query Method: Script Based

where is sören now

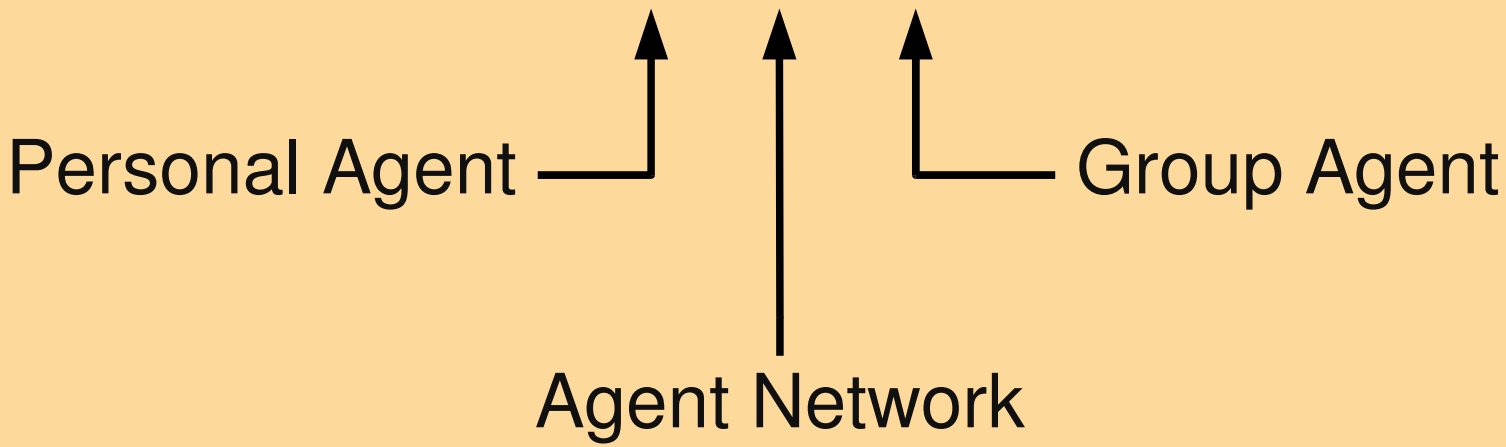
```
// where can we find infos about the subject
documents = context.query(NAMESPACES + "SELECT DISTINCT ?cal "+
      "WHERE{?cal rdf:type ical:Vcalendar " + ...)

// build the next query based on the first one
if(documents.counter < 1) context.sendMessageToUser("Sorry, ...")
else{   documents.each(){
          res.getResultRows().each(){ GRAPHS += "FROM NAMED <${it["cal"]}> " } }

      events = context.query(NAMESPACES + "SELECT DISTINCT ?loc ?sum"+
          GRAPHS +
          "WHERE { GRAPH ?g { "+
          "?s ical:dtstart ?sbn. ?sbn ical:dateTime ?stime."+
          "?s ical:dtend ?ebn. ?ebn ical:dateTime ?etime."+
          "OPTIONAL {?s ical:location ?loc.} " + ... }
```

Evaluation

Use case / template	runtime	Sources
What is / Tell me (the) * of *	2.3 / 3.9 / 1.5	FOAF + Jabber Network
Who is member of *	3.5 / 4.3 / 1.6	Group endpoint
Tell me more about *	3.2 / 5.6 / 1.1	DBpedia
Where is * now	5.1 / 6.7 / 4.2	FOAF + Google calendar
Free dates * between * and *	5.1 / 6.8 / 4.7	Google calendar + OntoWiki
Which airports are near *	- / - / 3.4	DBpedia



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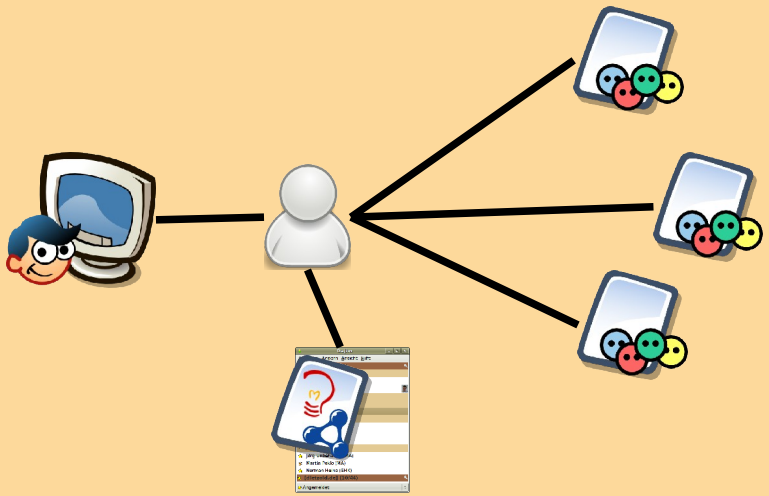
```
Tell me the room of Thomas

From OntoWiki
* 5-09 (Thomas Riechert)
```



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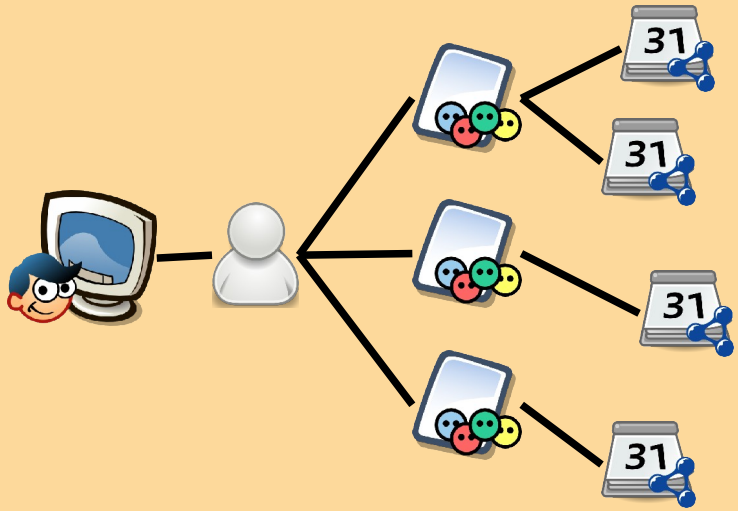
```
Where is Thomas now?

I have found 1 Calender ...

Cafeteria (Summary: Lunch)
```



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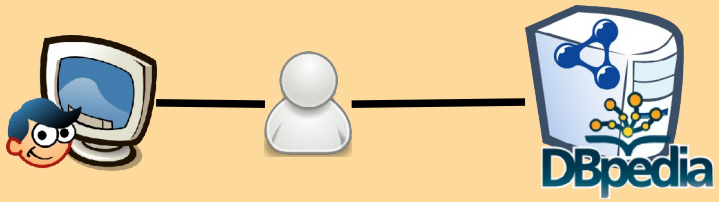
```
Tell me more about Tenerife

Tenerife can be a: Island,
                   City, ...

Tell me more about Tenerife
                   the Island
```



Conclusion

xOperator

- Interconnects the Semantic Web with IM
- Uses IM clients to query RDF data
- Utilizes the users IM neighbourhood
  - to obtain a trusted subset of the Semantic Web
  - to hold the context of semantic queries

Thank You

- More information:

  http://aksw.org/Projects/xOperator/

- XMPP / Jabber demo agent:

  xoperator-demo@aksw.org