

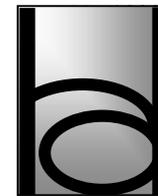


Middleware Support for Real-Time Stream Processing

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HAL Software



Consiglio Nazionale delle Ricerche
Istituto di Calcolo e Reti ad Alte Prestazioni

Sede di Napoli

Roadmap

1. Rationale
2. Objectives of Project
3. Project Leader
4. Other Partners
5. Fundings
6. Overall Architecture
7. Application Domains
8. Preliminary Results
9. Contact Info



Rationale

- Presentations:
 - Koji
 - Manish
- Special session (Dependable Computing in 2031):
 - Tom & Robert
 - Luca

**The problem is not the information ...
it is the ability to process it
in a fast and reliable way**

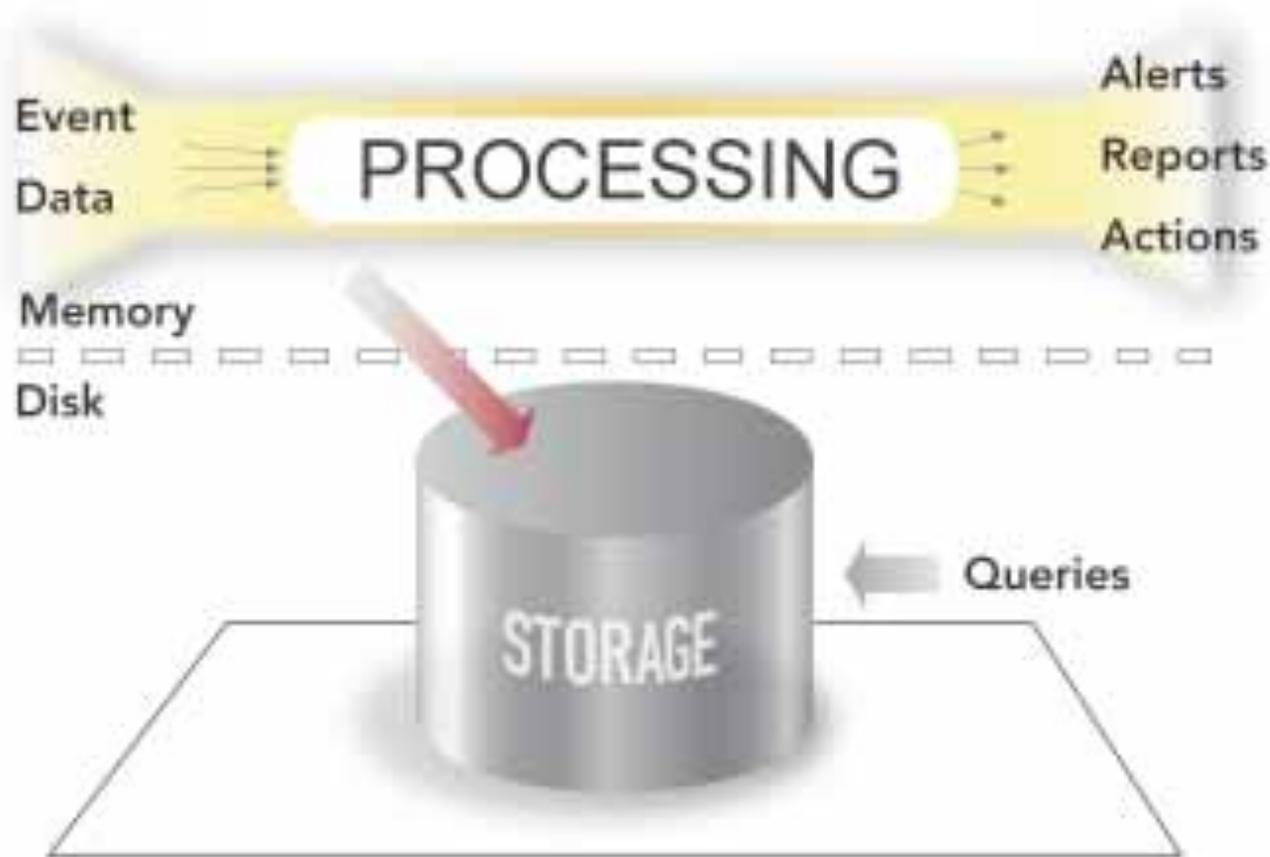


Objectives of Project Proposal

- To design and implement a middleware infrastructure for real-time processing of data
- Multiple data feeds
 - Geographically distributed
 - Highly heterogeneous
- Self-* properties
 - Self-configuration
 - Self-optimization
 - Self-healing
 - Self-protection
- Real-time behavior
 - Challenging performance requirements (more later)
- Stream processing computing paradigm (more later)



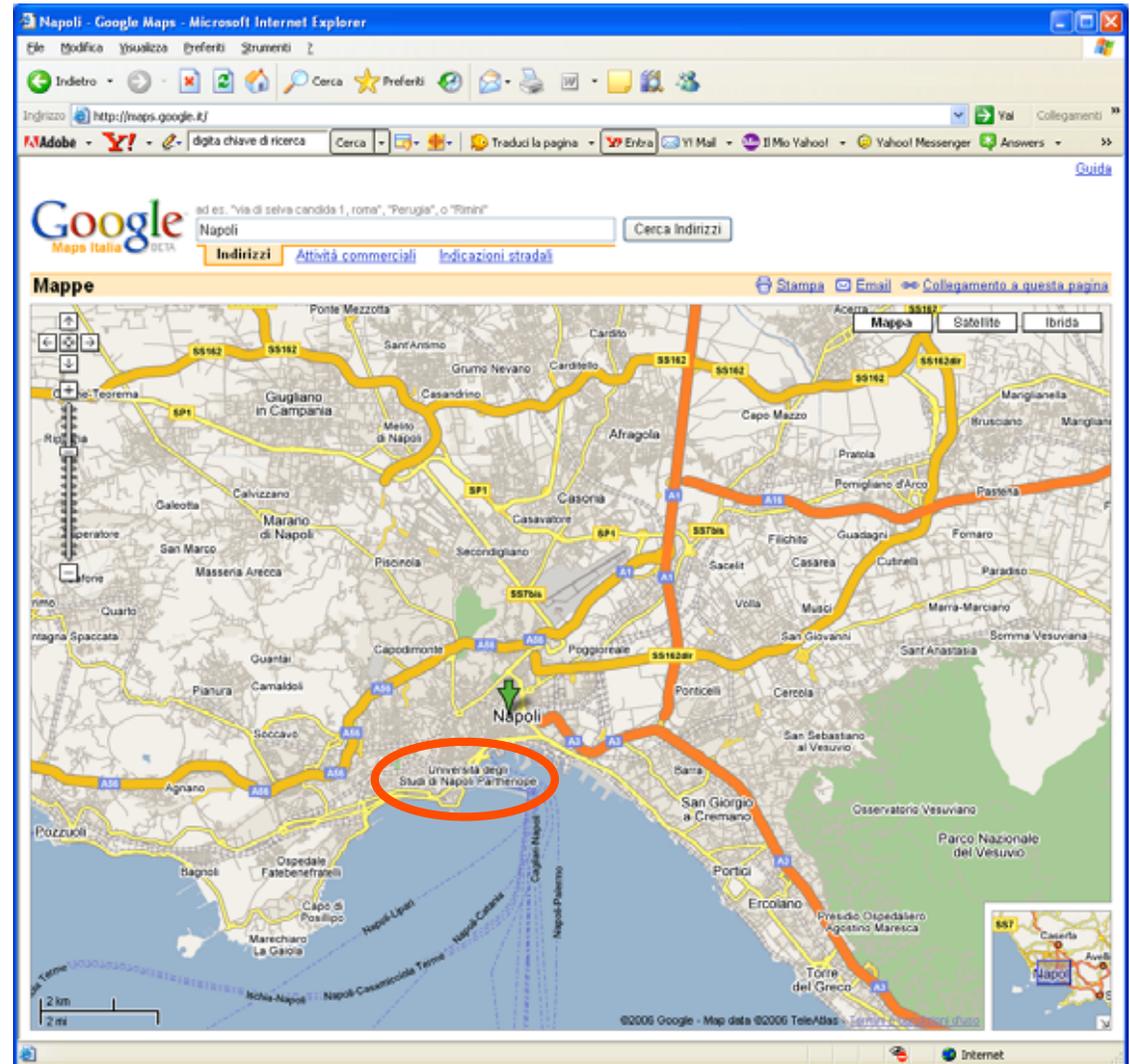
Stream processing computing paradigm



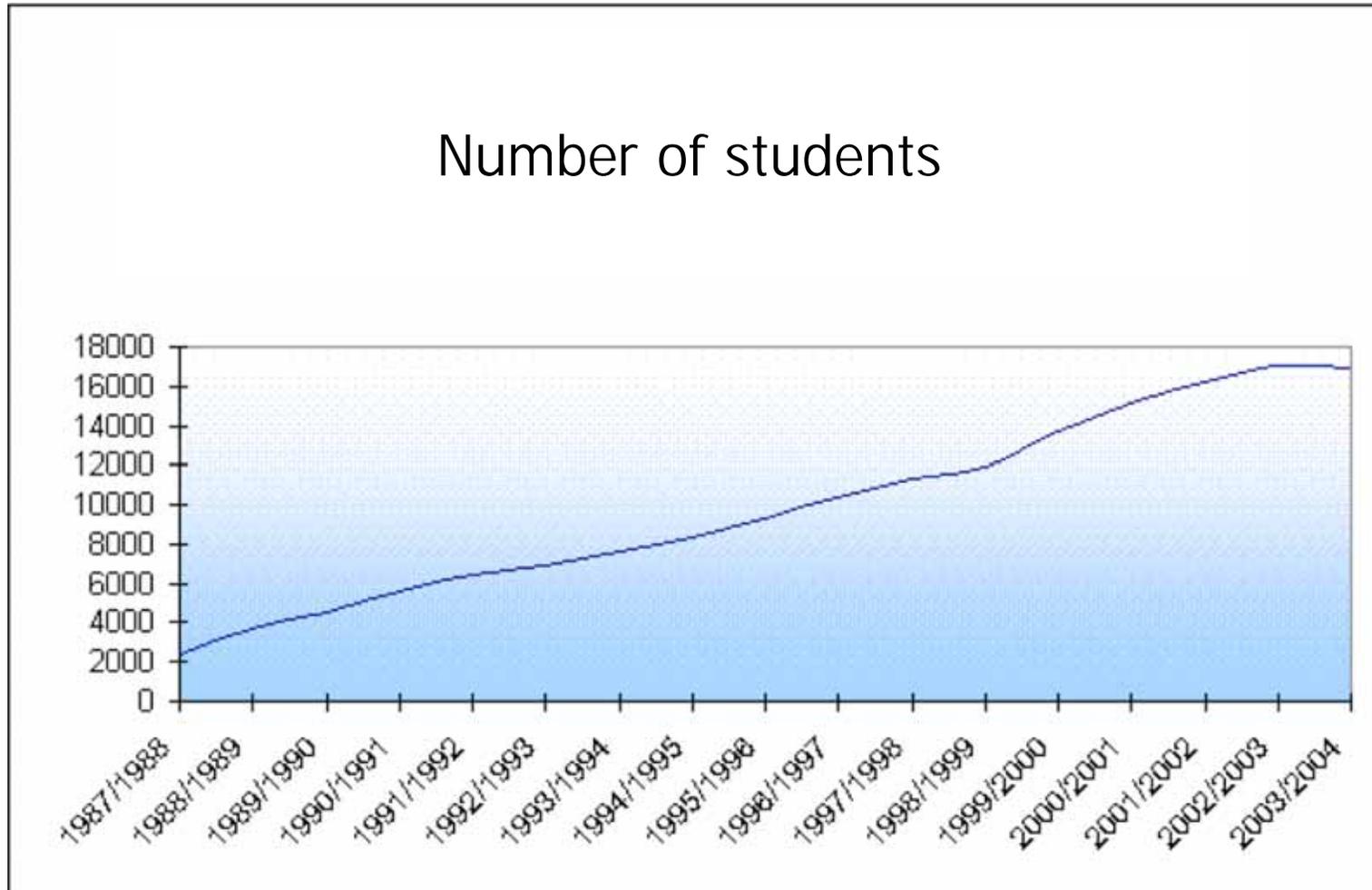
Project Leader - 1

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Project Leader - 2

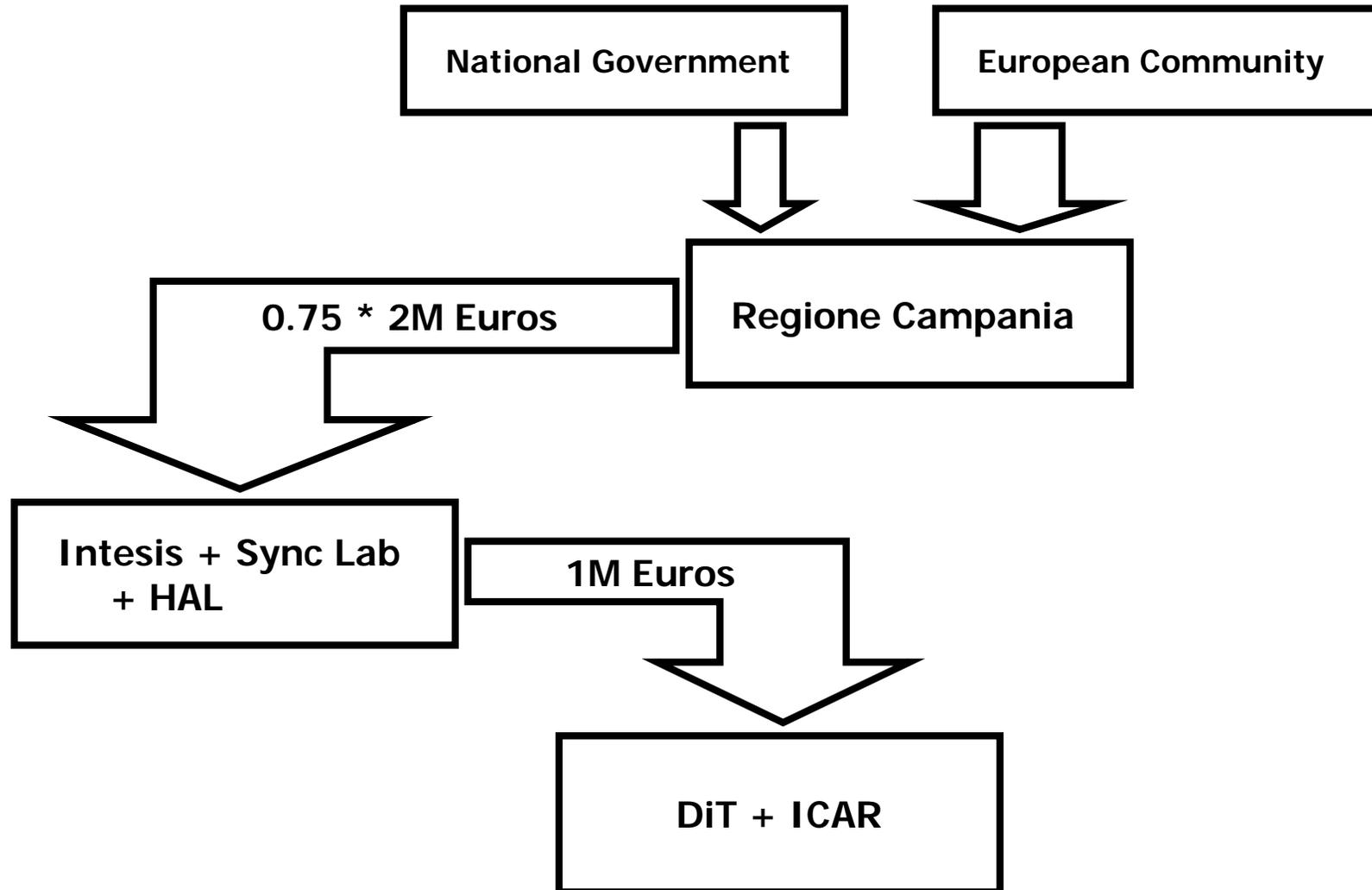


Other Partners

- Companies:
 - Intesis Engineering (<http://www.ineng.it/>)
 - Sync Lab (<http://www.synclab.it/>)
 - HAL Software
- Research Centers
 - Institute for High Performance Computing and Networking - National Research Council
(<http://kms.icar.cnr.it/icarkms/portal/pane0/Home>)



Funding Request & Mechanism – Option 1



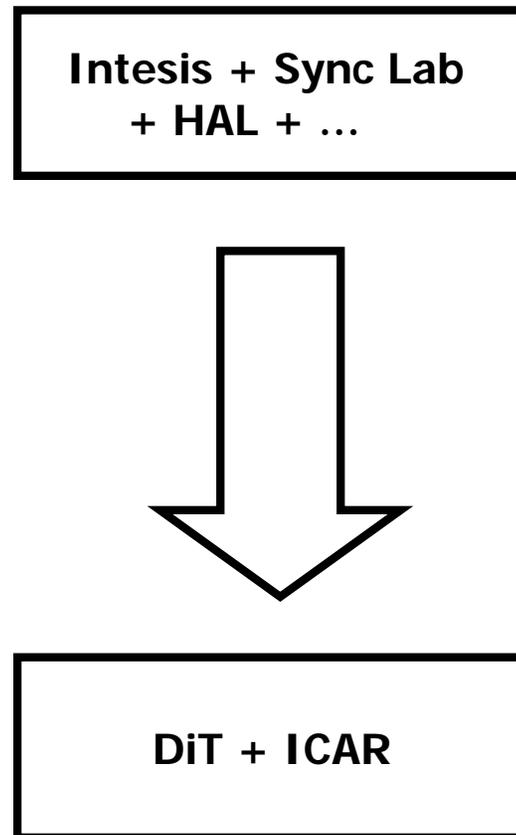
Regione Campania



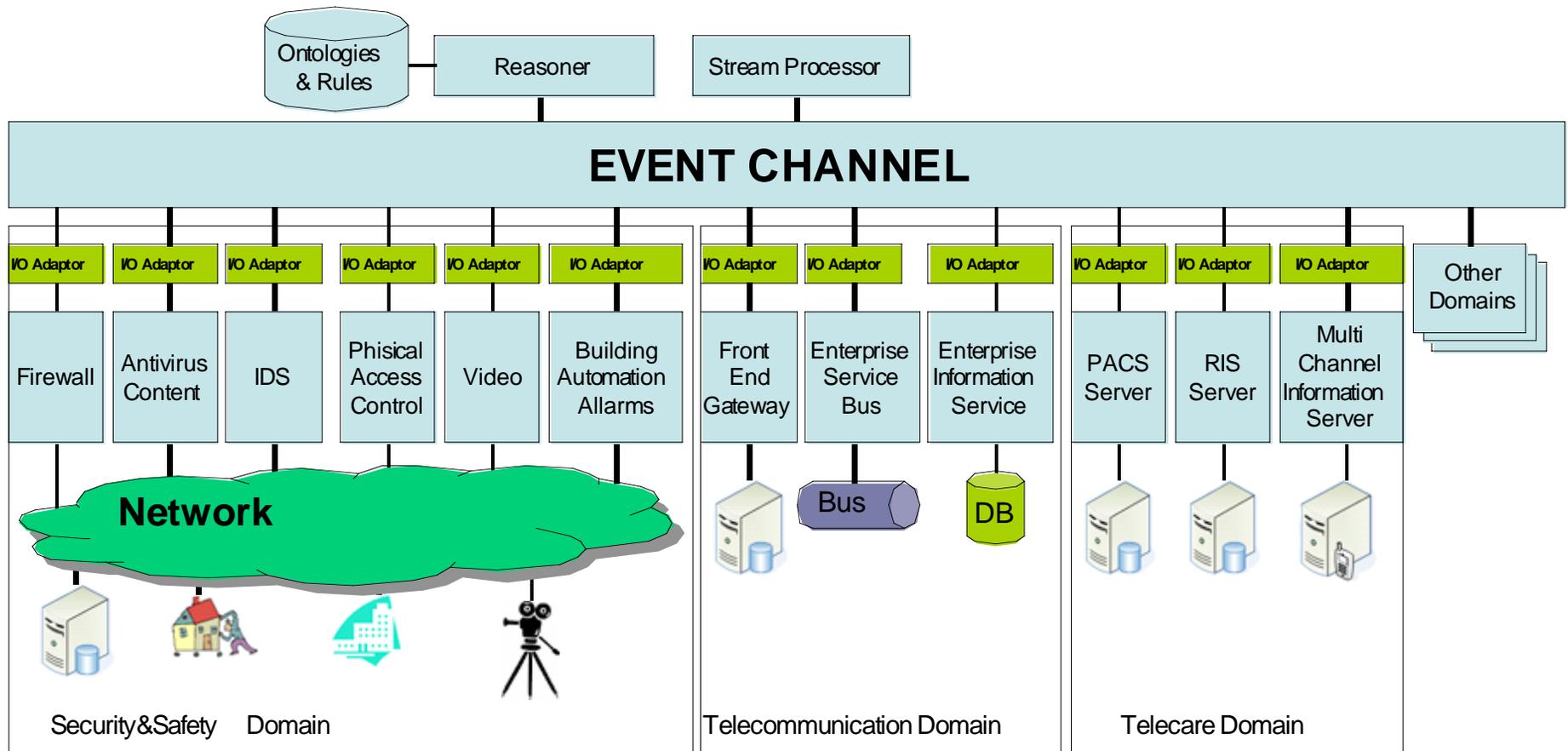
A screenshot of the Google Maps website in Microsoft Internet Explorer. The browser window title is "Google Maps - Microsoft Internet Explorer". The address bar shows "http://maps.google.it/". The search bar contains the text "ad es. 'via di selva candida 1, roma', 'Perugia', o 'Rimini'". Below the search bar are links for "Indirizzi", "Attività commerciali", and "Indicazioni stradali". The main content area is titled "Mappe" and includes a link to "Scarica Google Maps sul tuo cellulare". Under "Esempi di ricerca:", there are three examples: "Vai ad una località" with a link to "Venezia" and "via di selva candida 1, roma"; "Cerca attività commerciale" with links to "Alberghi vicino a Padova" and "pizza"; and "Ottieni indicazioni" with links to "da Forlì a Marradi" and "da Via Pietro Roselli, 4 Roma a Chivasso". Below this is the instruction: "Trascina la mappa con il mouse o fai doppio clic nel centro." The map itself shows Italy with various cities labeled, including Caserta, Benevento, Napoli, Avellino, and Salerno. The map is zoomed in on the Campania region. At the bottom of the map, there is a scale bar (0, 100, 200 km) and copyright information: "©2006 Google - Map data ©2006 TeleAtlas".



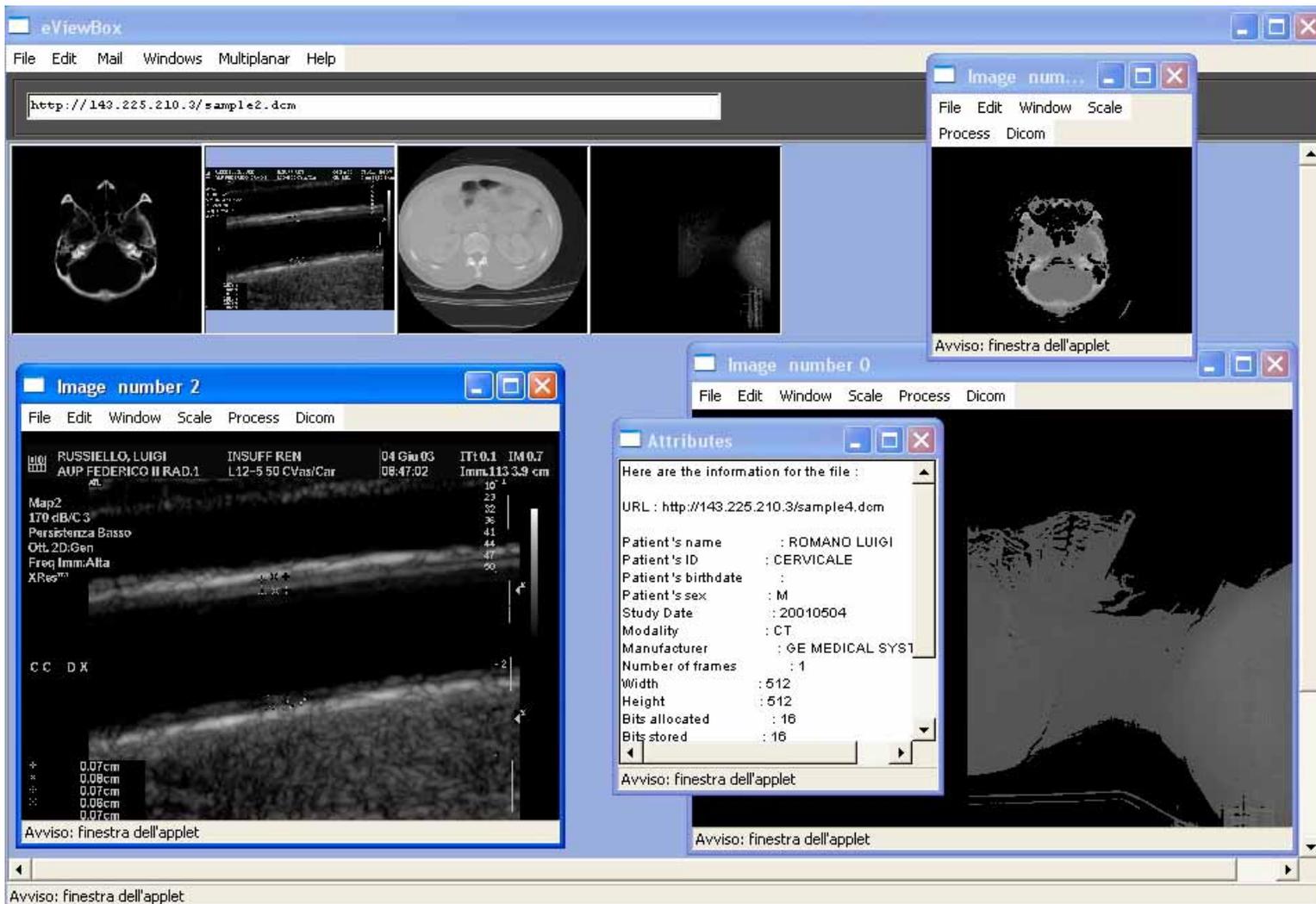
Funding Request & Mechanism – Option 2



Overall Architecture & Application Domains

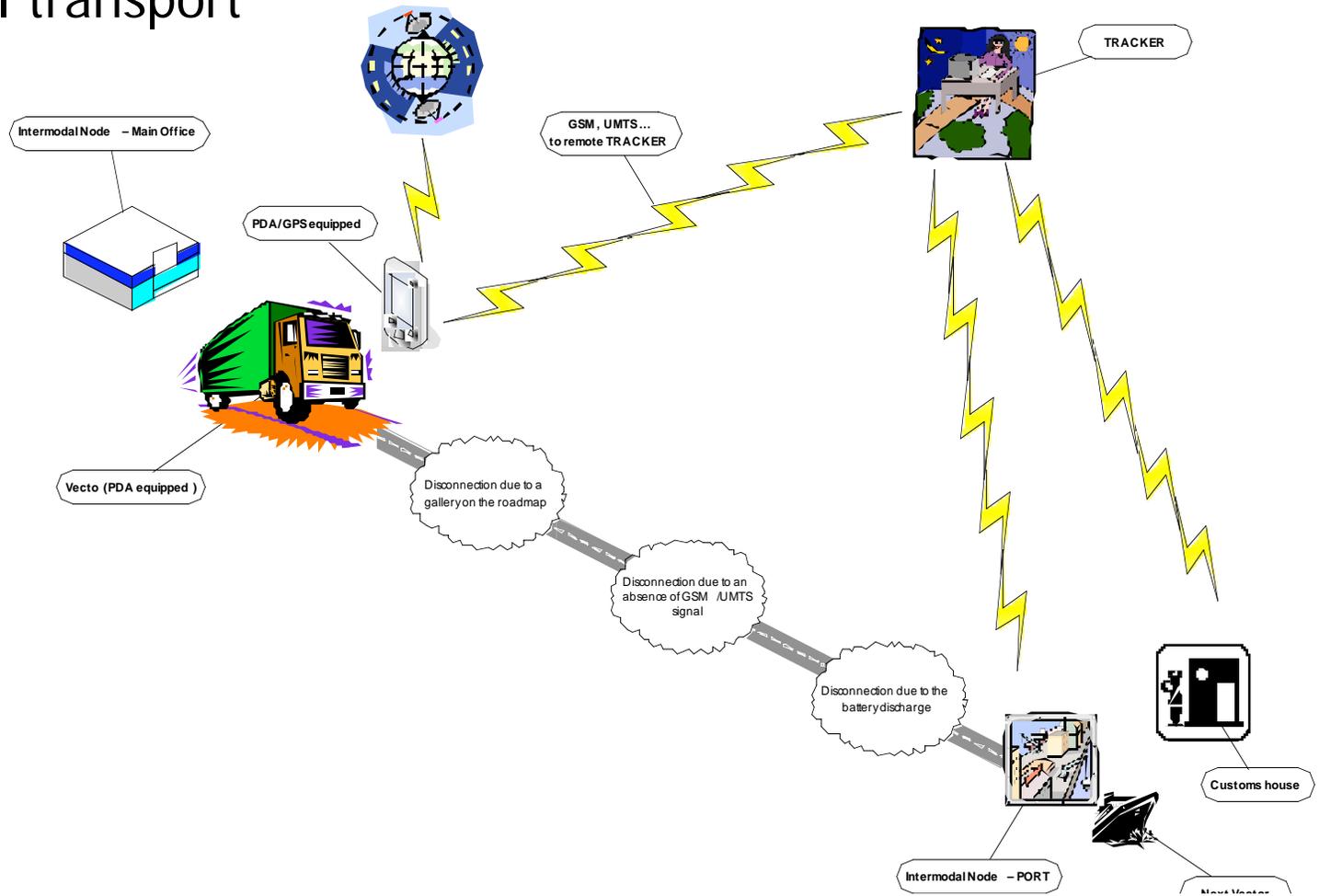


RIS/PACS Sample Application



Additional Application Domains

1. Multi-modal transport
2. ...

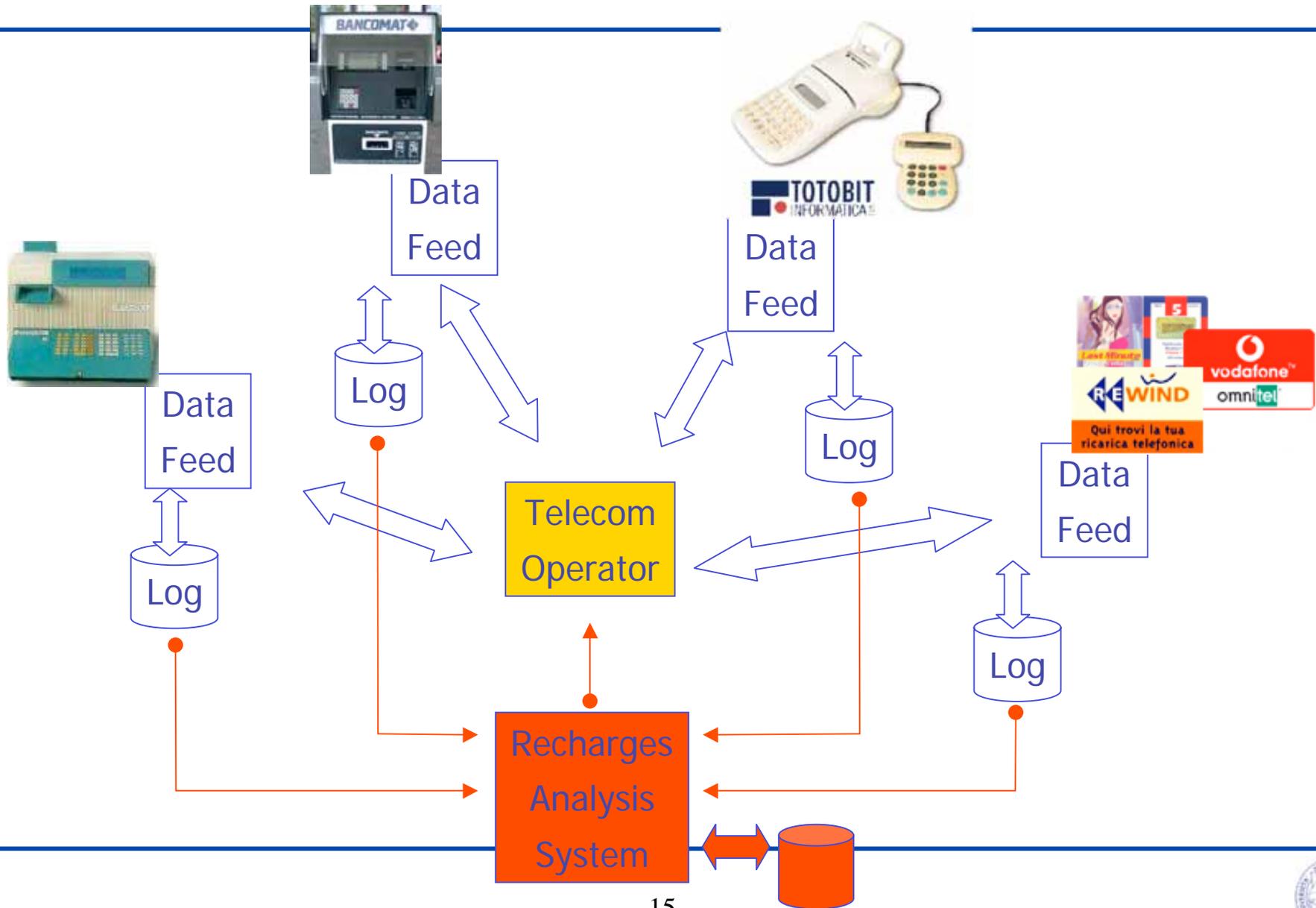


Telecom Domain Case Study - 1

The screenshot shows the TIM website in Microsoft Internet Explorer. The browser window title is "TIM - Microsoft Internet Explorer". The address bar shows "http://www.tim.it/consumer/homepage.do". The page features a main banner for "Relax" with the text "Scegli il tuo Relax... Tre soluzioni per comunicare: Tutto Relax, Telefono Relax, Auto Ricarica". To the right, there is a "PRIVATI" menu with options like "TARIFFE", "PRODOTTI", "SERVIZI", "PER L'ESTERO", "PROMOZIONI", "MILLENNIUM", and "INFO & FUN". Below the banner, there are sections for "TIM NEWS" and "Assistenza e self service" with a "119" helpline number. The footer includes copyright information for TELECOM ITALIA 2006 and a "Member of freemove alliance" logo.



Telecom Domain Case Study - 2



Issues & Requirements

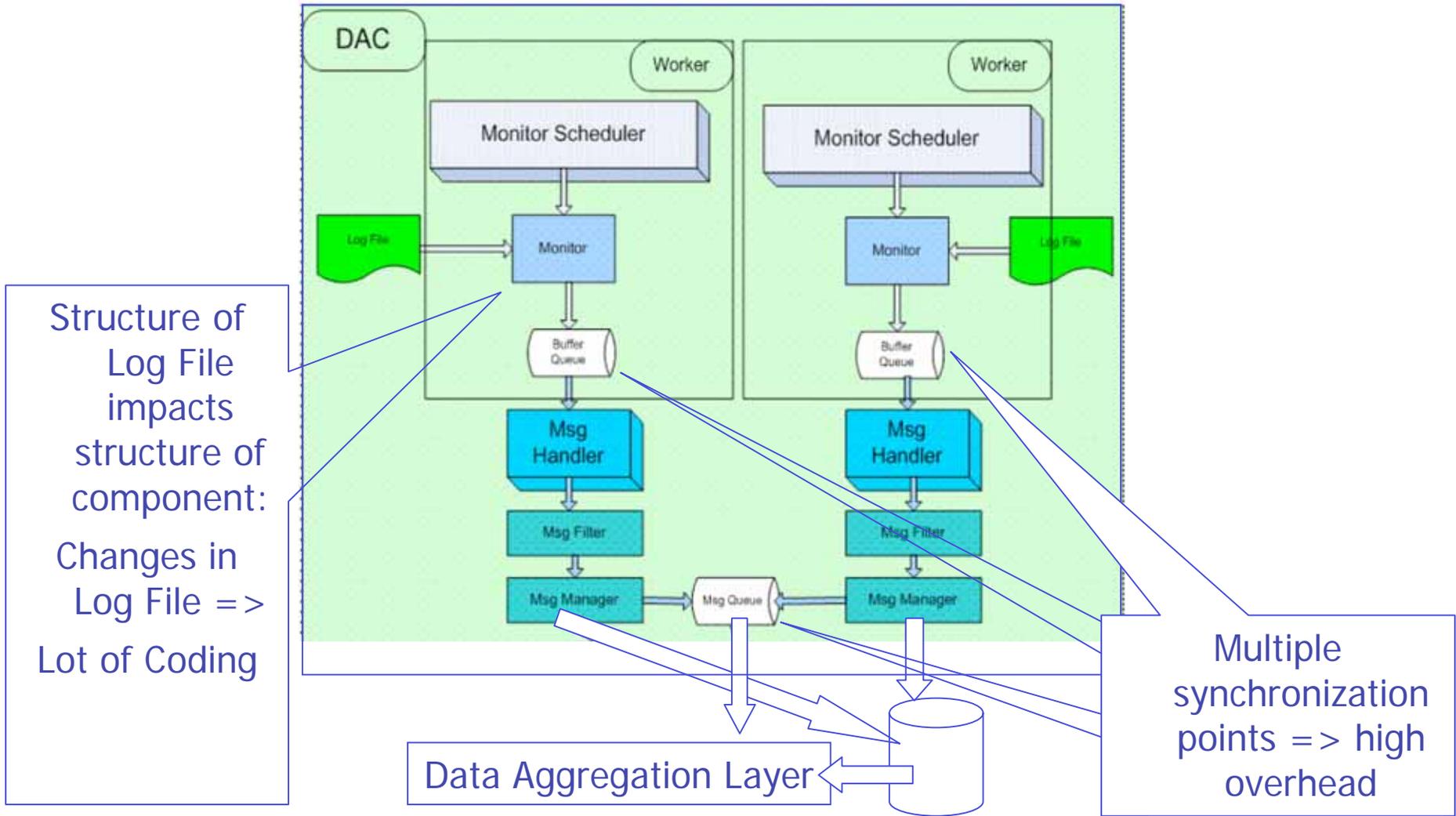
- Highly heterogeneous Log Files

```
08 Sep 2005 14:35:39,500 INFO - <Canale On Demand> <Init > <7F00000143203
08 Sep 2005 14:35:39,521 INFO - <ProcessoreRicaricaOnDemand> <VerificaUtenti
08 Sep 2005 14:35:39,540 INFO - <Canale On Demand> <Init > <7F00000143203
08 S 2004-03-05 00:00:00.875802|0|APP|IBSFuncComm|00000|<IBTrace.c line: 454>[4750]<OUTPUT L
08 S 2004-03-05 00:00:00.878018|0|APP|IBSFuncComm|00000|<IBTrace.c line: 499>[7670]<INPUT Li
08 S 2004-03-05 00:00:01.330684|0|APP|IBSFuncComm|00000|<IBTrace.c line: 499>[7670]<OUTPUT L
08 S 2004-03-05 00:00:03.323529|0|APP|IBSFuncComm|00000|<IBTrace.c line: 499>[2278]<INPUT Li
08 S 200
<log4j:event logger="obg" timestamp="1122610000001" level="INFO" thread="ExecuteThread: '13'
200 <log4j:message><![CDATA[*7F00000142E9E1C010000000*]*vuoto*]*CONFIGURAZIONE TROVATA ALLA RIGA
200 -->parametri= START=64 LEN=3 VALUE=H80
200 -->parametri= START=25 LEN=3 VALUE=SEV
200 |]]></log4j:message>
200 </log4j:event>
<log4j:event logger="obg" timestamp="1122610000002" level="INFO" thread="ExecuteThread: '13'
<log4j:message><![CDATA[*7F00000142E9E1C010000000*]*vuoto*]*Ricerca in corso del servizio:SIM
</log4j:event>
```

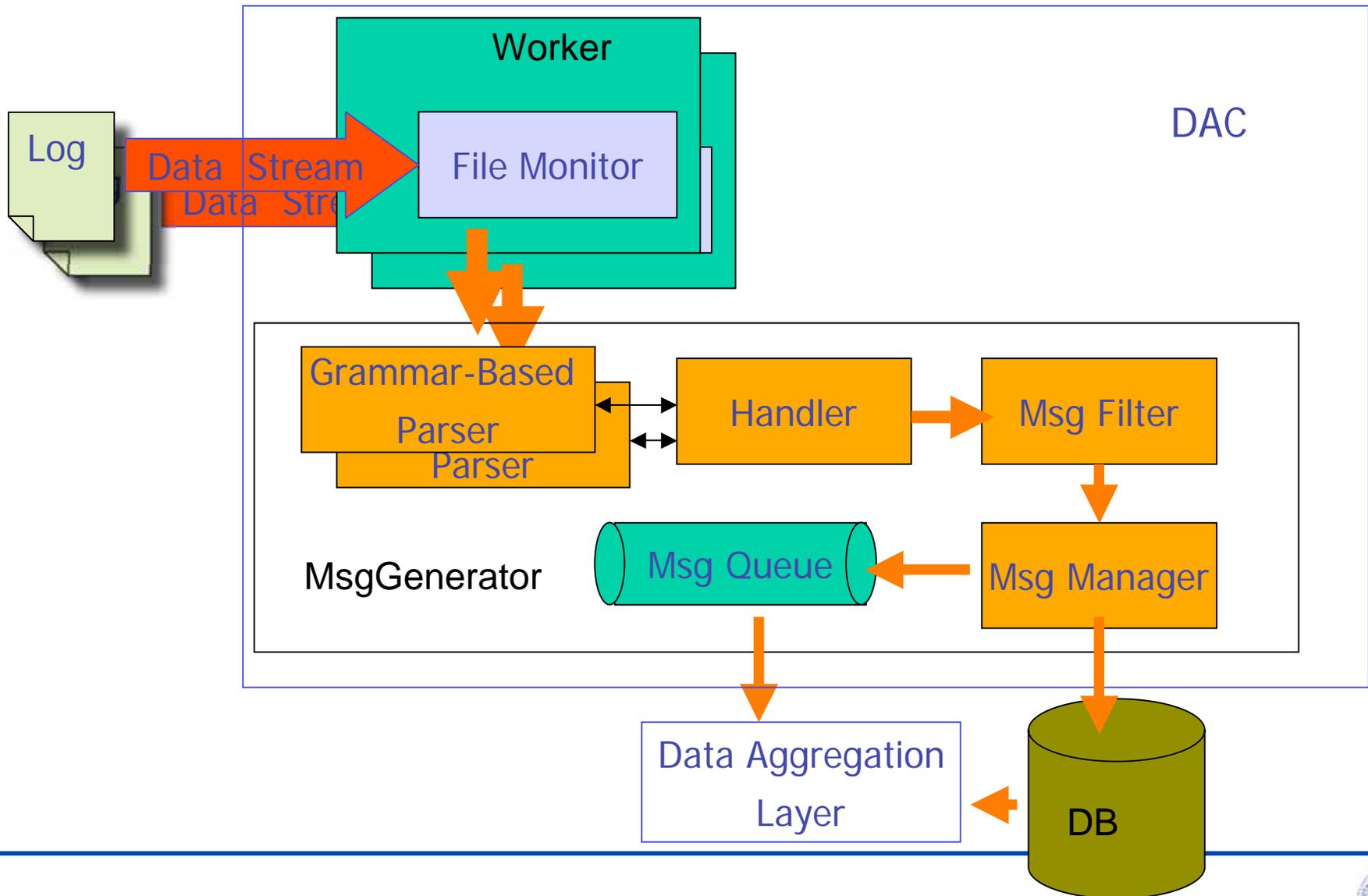
- New Log types added at run-time
- Large Data Volumes/Rates
 - Up to 300 Events/sec logged (can't achieve with "current" storage technologies)
- Soft Real-Time constraints



Old Architecture



New Architecture



Key improvements

- Parser processes a data stream:
 - No more delays do to synchronization at buffers/queues
- Simple and regular log file structure:
 - Described by means of a grammar
- Widely general, easy-to-configure parser:
 - Code implementing specific parsers dynamically generated (by means of a parser generator), compiled, and integrated
 - A parser generator is a tool that reads a grammar specification and converts it to a Java program that can recognize matches to the grammar

```
...
void field0() : {
}
{
    (<ALARM> | <DEBUG> |
    <ERROR> | <FATAL> |
    <INFO> | <OFF> |
    <WARN>) {}
}

void field1() : {
}
{
    <LABEL> (<SPACE>)* {}
}
...
```



Technologies

- Tomcat (in the development phase)
 - <http://tomcat.apache.org/>
- BeaWeblogic (in the deployment phase)
 - <http://www.bea.com/framework.jsp?CNT=index.htm&FP=/content/products/weblogic>
- Java Compiler Compiler (JavaCC 4.0) - The Java Parser Generator
 - <https://javacc.dev.java.net/>
- Oracle 9.1 → Oracle TimesTen - Main Memory DBMS
 - <http://www.oracle.com/technology/software/products/timesten/index.html?>
- FPGA?



Contact Info

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