B.I.R.O.

Best Information through Regional Outcomes

A European Public Health Project, DG-SANCO, 2005-2008

R.R.D.M. System

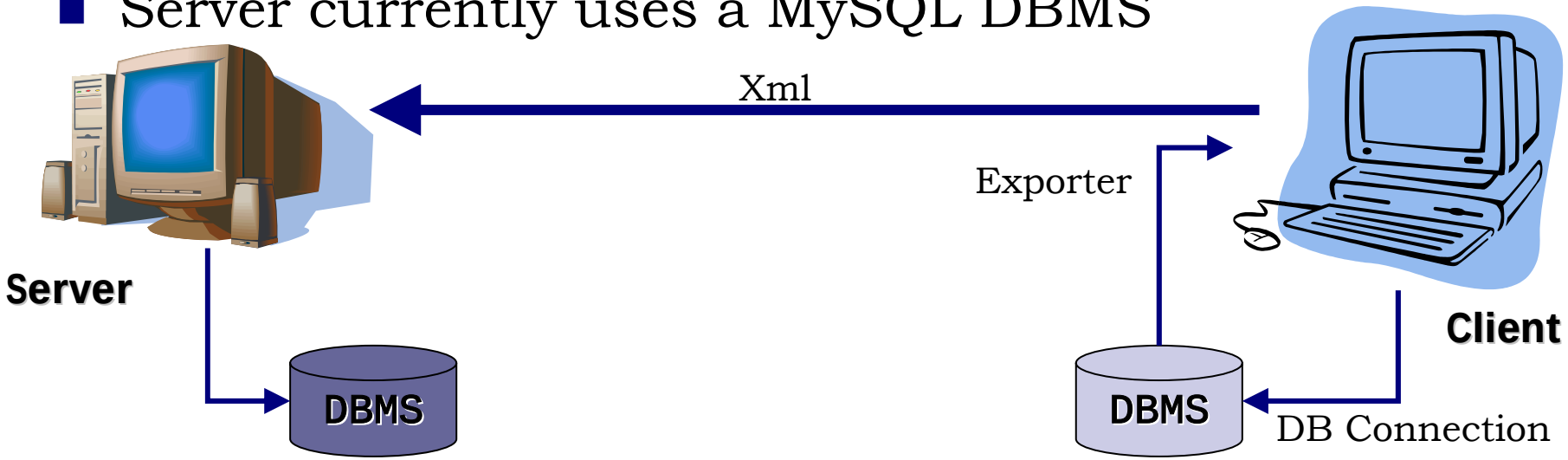
Regional Register Diabetes Mellitus

Summary

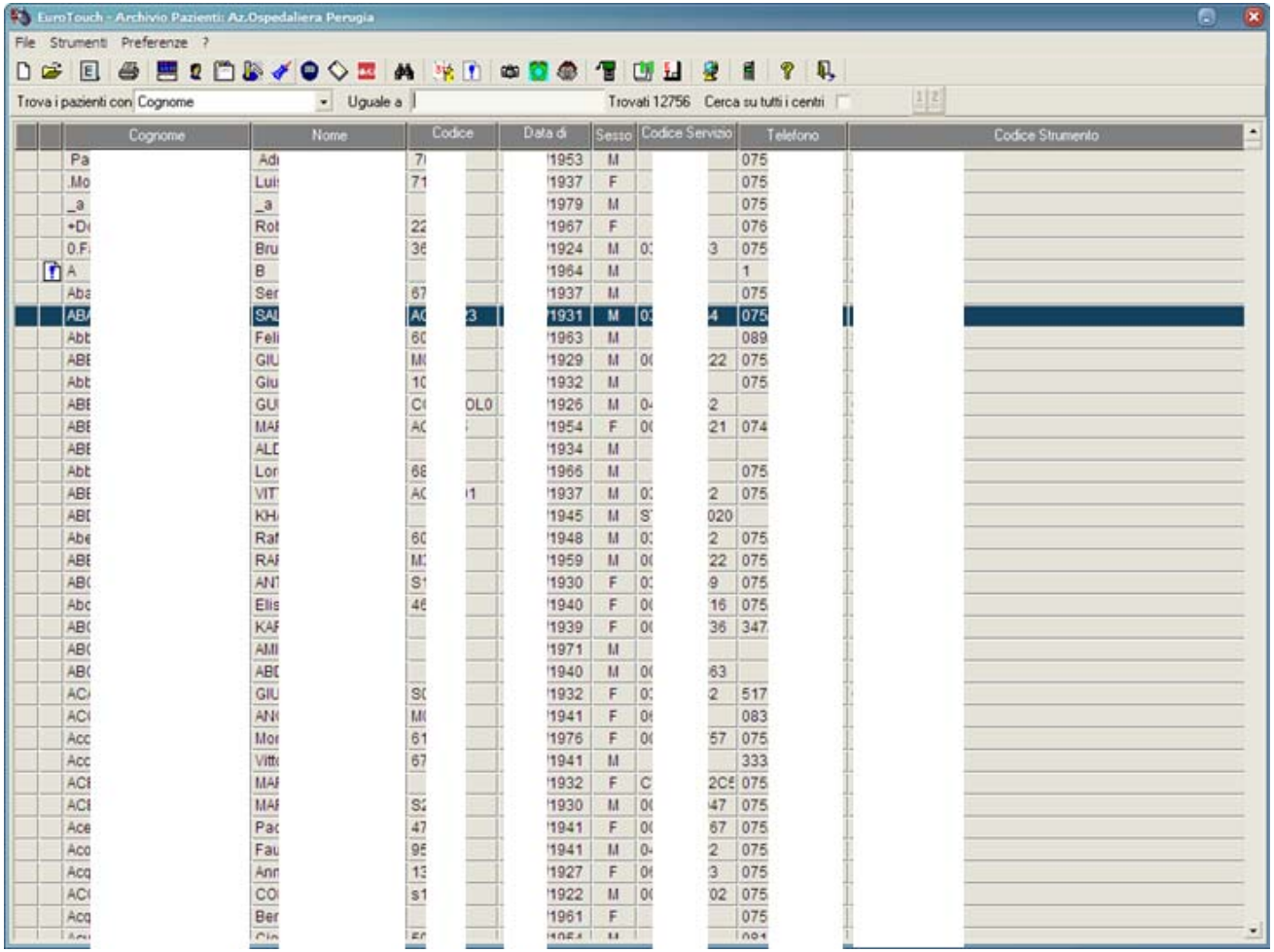
- What is R.R.D.M. System
- Its architecture
  - Server
  - Client
    - Plug-in architecture
    - Exporter
- Protocol
- Example
- Future releases

What is R.R.D.M. System

- R.R.D.M. System is a Java client/server tool that allows to export data from a DBMS on a client PC to another DBMS on another PC
- Client and server DBMS have neither to be necessarily the same nor have the same structure (tables and columns)
- Server currently uses a MySQL DBMS



Electronic Medical Record Umbria Diabetes Clinics



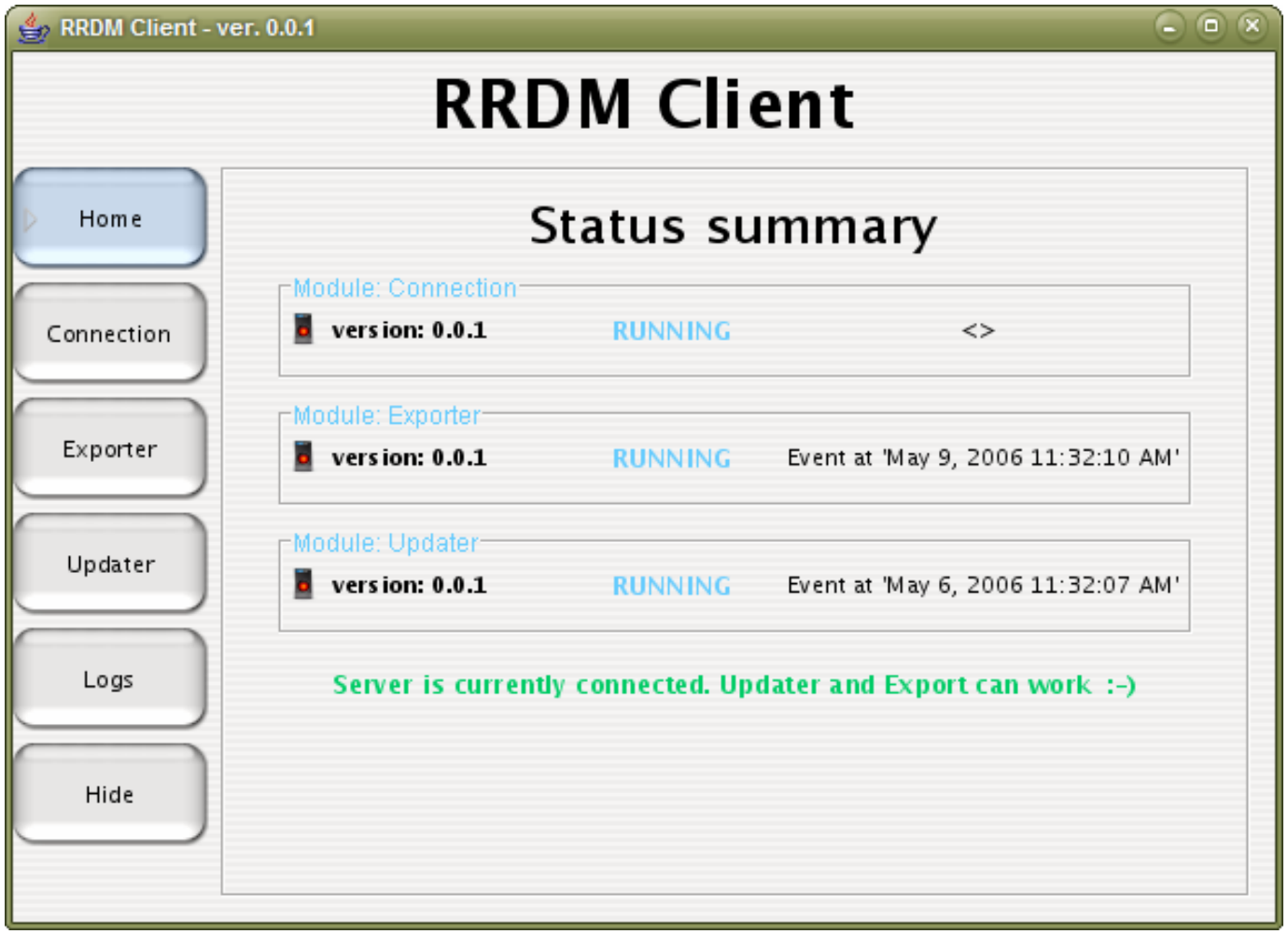
Architecture (server)

- The server listens for clients' connections
- Authentication data (username and password) are needed for connection to be successful
- Different usernames have different roles (client, admin)
- Server is multi-thread, can accept many connections

Architecture (client)

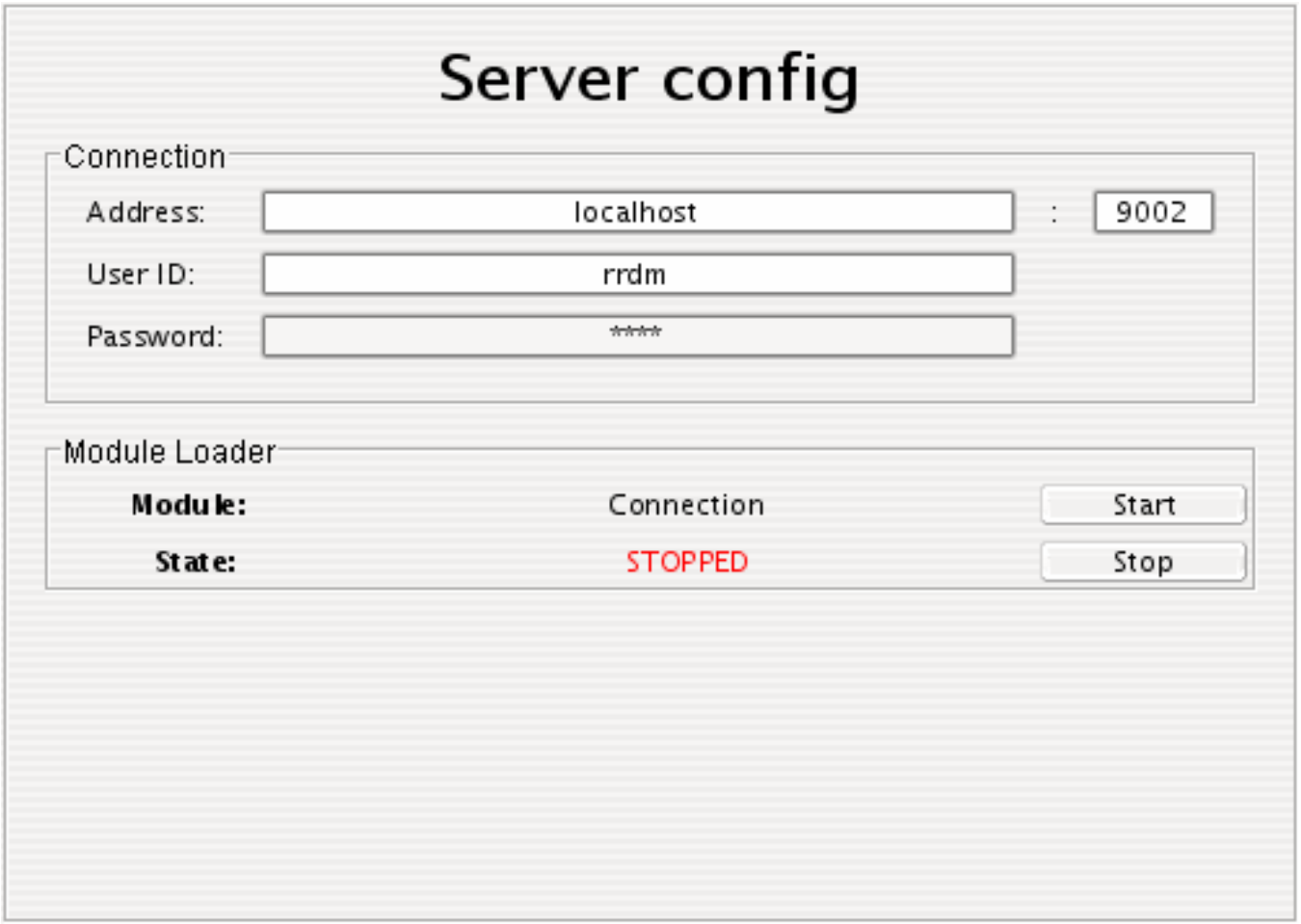
- Client has a plug-in architecture (a plug-in is called module)
- Modules:
  - ConnectionModule: connects to server and log-in
  - UpdaterModule: checks periodically for updates, downloads and installs them as soon as found (all automatically)
  - ExporterModule: exports data from a db to server
- Is extensible with more modules
- Run in background as a Windows service (you can find a tray icon in the taskbar)
- Easily can be ported to another O.S. (the only native element is the tray icon)

Client – Main Window



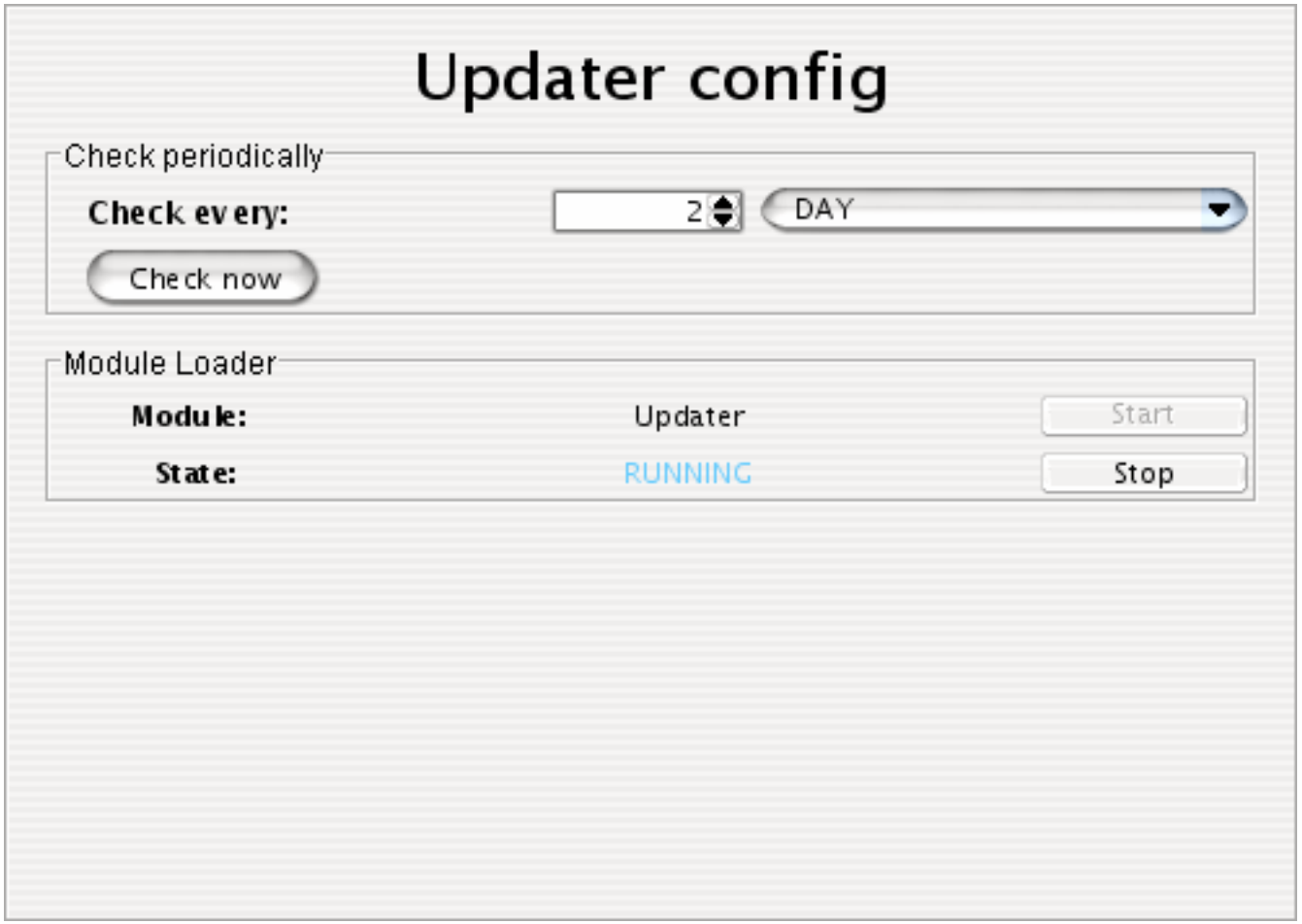
- Status of installed modules
- A separate panel for each module
- Application logs (with an implemented log-rotate tool)

Client – Server configuration



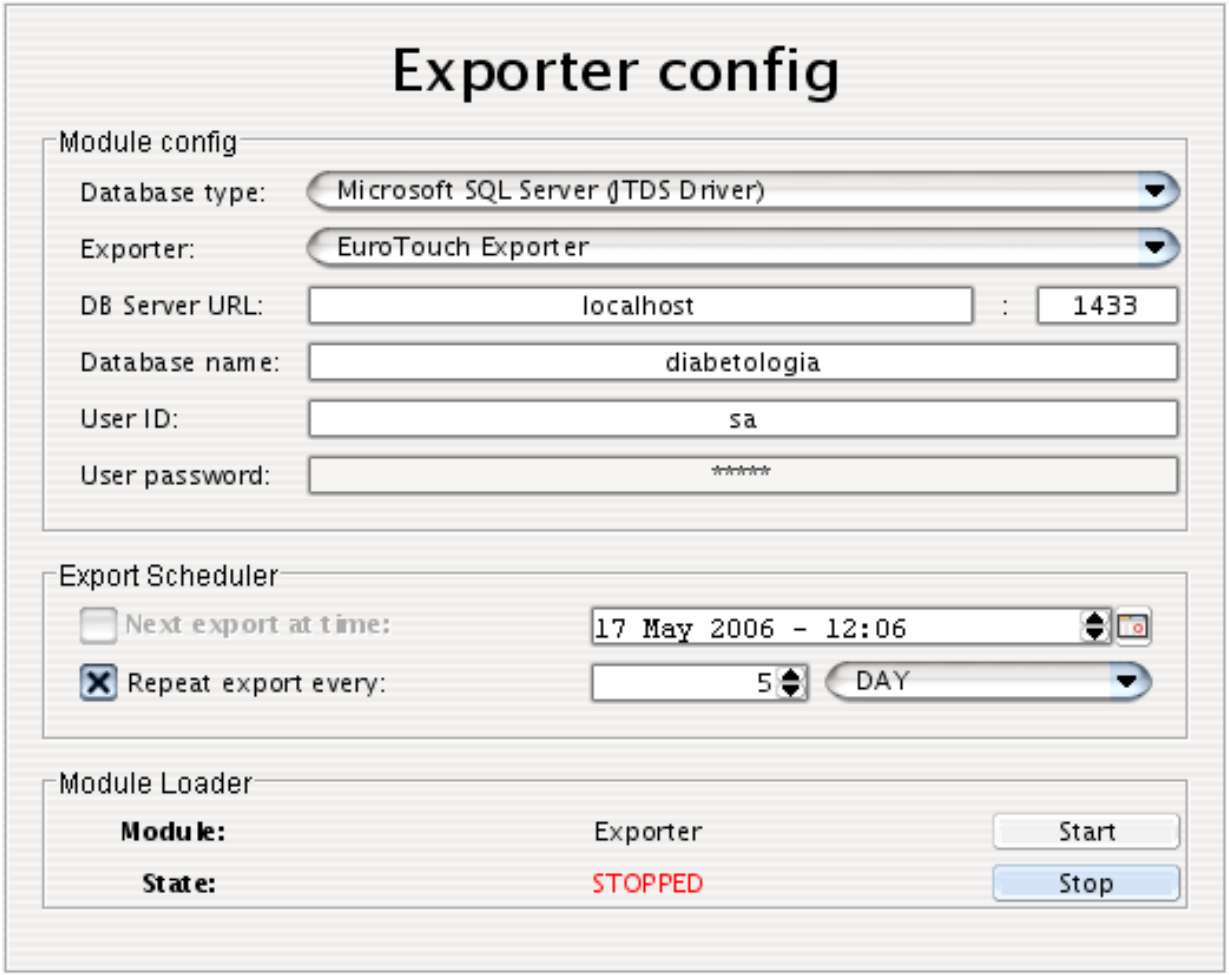
- Can specify address and log-in data for server connection
- This module connects to the server automatically until success or user abort

Client – Updater configuration



- Can check at the moment or specify a date/time interval between checks

Client – Exporter configuration



- Can define database type (among supported*)
- Exporter
- Database connection data
- Date and time to schedule export

* In principle there's no limitation to supported databases, currently only Microsoft SQL Server and MySQL are implemented.

Exporter - Intro

- The core of the system is the Exporter: reads data from database and exports to server
- Exporter is implemented with a plug-in structure, so that many Exporter-type can be installed and used with this tool
- One Exporter has been implemented, EuroTouchExporter.

Exporter – Configuration

```
<?xml version="1.0" encoding="UTF-8"?>
<EuroTouchExportConfig version="0.0.1">
   <TABLE name="Anagrafica" touchKey="CodSanitario" rrdmKey="codice">
        <COLUMN name="codice" touchTable="AnagDati" touchName="CodSanitario"/>
        <COLUMN name="id_anag" touchTable="AnagDati" touchName="IdAna"/>
        <COLUMN name="name" touchTable="AnagDati" touchName="Nome"/>
        <COLUMN name="surname" touchTable="AnagDati" touchName="Cognome"/>
        <COLUMN name="genre" touchTable="AnagDati" touchName="Sesso"/>
        <COLUMN name="dateOfBirth" touchTable="AnagDati" touchName="DDN"/>
   </TABLE>
   <TABLE name="Valori" touchKey="IdAna" rrdmKey="id_anag">
        <COLUMN name="id_anag" touchTable="ValoriNumDati"touchName="IdAna"/>
        <COLUMN name="id_valori" touchTable="ValoriNumDati" touchName="IdValore"/>
        <COLUMN name="date" touchTable="ValoriNumDati" touchName="Data"/>
   </TABLE>
</EuroTouchExportConfig>
```

Tells exporter which tables and columns have to read from local database and the corresponding server tables

Exporter – Xml Data

```
<?xml version="1.0" encoding="ISO-8859-15"?>
<DATABASE date="Wed Apr 19 12:41:23 CEST 2006">
    <TABLE name="Anagrafica" col_count="6" key ="codice" size="13454">
        <DATA key="null">
            <COLUMN name="codice" value="null"/>
            <COLUMN name="id_anag" value="0"/>
            <COLUMN name="name" value="!"/>
            <COLUMN name="surname" value="!"/>
            <COLUMN name="genre" value="0"/>
            <COLUMN name="dateOfBirth" value="1900-01-01 00:00:00.0"/>
        </DATA>
        <DATA key="XXXXXXX">
            <COLUMN name="codice" value="XXXXXXX"/>
            <COLUMN name="id_anag" value="2"/>
            <COLUMN name="name" value="VITTORIO"/>
            <COLUMN name="surname" value="XXXXXXX"/>
            <COLUMN name="genre" value="M"/>
            <COLUMN name="dateOfBirth" value="1927-02-24 00:00:00.0"/>
        </DATA>
...
</TABLE>
</DATABASE>
```

Exporter - Server

- Server reads exported Xml data and store them into server database according to Xml tags' name

R.R.D.M. Features

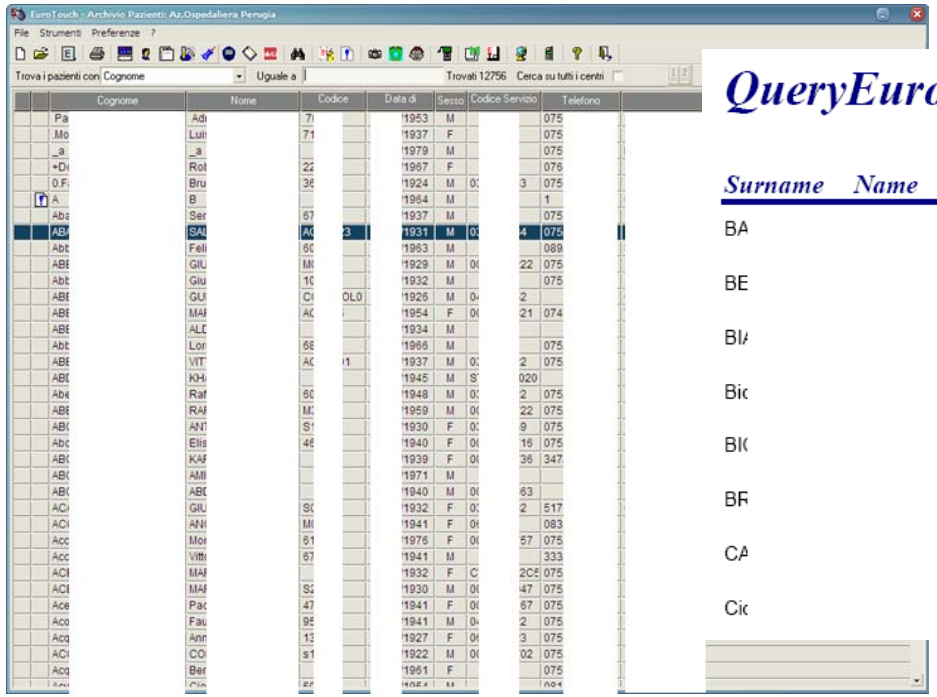
1. Plug-in architecture:
   - More modules can be added, more exporters can be implemented
2. Client does not need to know which database the server is using
3. Many exporters can run at the same time
4. Exporter does not need to know even which database the client is using (it is configured once at top level)
5. Client and server databases do neither have to be the same, nor have the same tables structures (names or columns)!!!
   - Any already defined and implemented database can be left as it is.
6. R.R.D.M. is an auto-updating tool that does not even need any user intervention, always up to date.

Protocol

- R.R.D.M. System uses a new implemented protocol running over TCP/IP
- Commands are transmitted between client and server by plain-text, so any simple text client, such as telnet, can connect to the server and communicate with it
- No command can be executed without authentication
- Executables commands change as role changes
- Protocol supports compressing exports data in ZIP format (all transparent to client and server) to speed up exports*, save money and time

* Note: plain text data can be compressed by 98% using a simple Zip compression algorithm: 54MB of data becomes only 900Kb to be transferred.

Example (EuroTouch)



QueryEuroTouch

Surname	*Name*	*Description*	*Value*	*RangeMin*	*RangeMax*
BA		Glicemia a digiuno	140	60	110
BE		Glicemia a digiuno	124	60	110
BI		Glicemia a digiuno	144	60	110
Bi		Glicemia a digiuno	222	60	110
BI		Glicemia a digiuno	342	60	110
BF		Glicemia a digiuno	139	60	110
CA		Glicemia a digiuno	235	60	110
Ci		Glicemia a digiuno	101	60	110

EuroTouch original data and a small reports of some of them

Example (R.R.D.M.)

- After automatic export to R.R.D.M. we have all data into a MySQL Database
- We can build a new report of the same data based, this time, on R.R.D.M.
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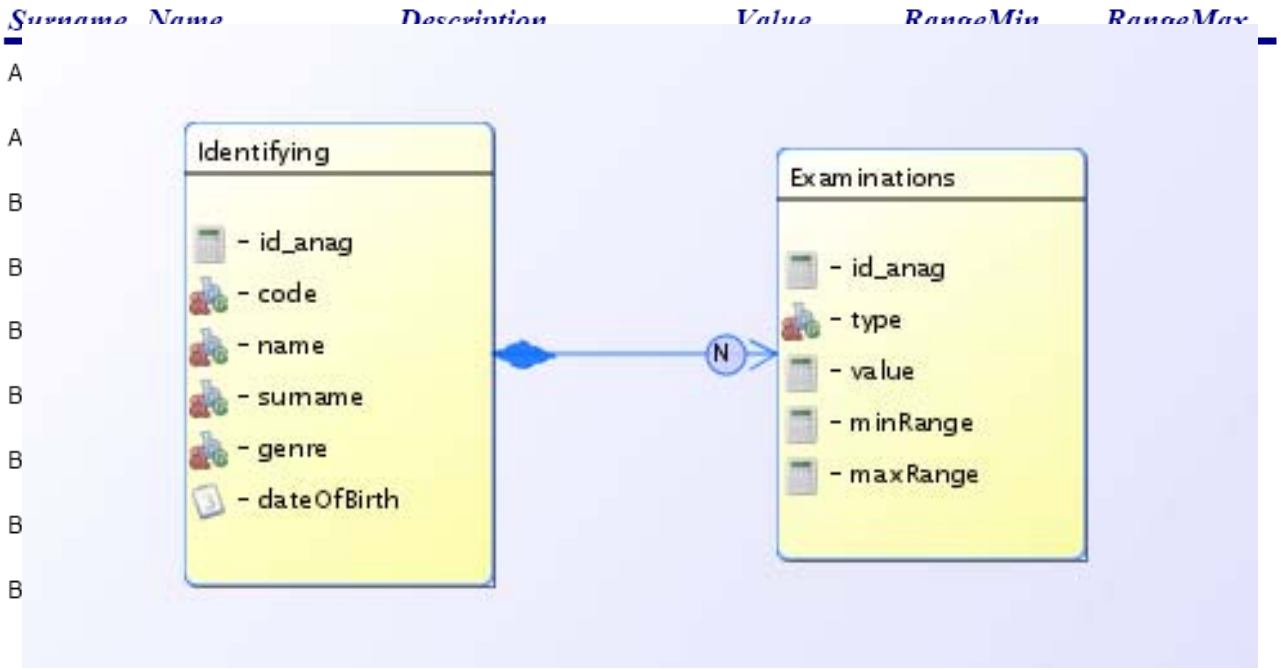

Limitations of R.R.D.M.

- Still beta version
- Only full-export is supported
  - First deletes old exported data, then stores new one
- Server import (due to search, delete and store) is slow and must be improved
- Management of data linkage from multiple databases not implemented

Future Releases

- Future releases will have the following features:
- Client:
  - More supported DBMS (at least PostgreSQL and Hypersonic SQL)
  - More exporters
  - Encrypting/Decrypting add-on to used protocol*
  - Data-linkage with regional administrative data
  - Linux support with a tray-icon for KDE/Gnome
- Server:
  - Admin tool to manage server status (commands are already implemented, it leaks of a graphical user interface)

*) Will be implemented using a private/public key algorithm to generate keys and maybe IDEA or 3-DES for encryption