Migrating the Italian Forestry data base from an Access-ArcView based architecture to a Php PostgreSQL-PostGIS and GRASS based system.

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The forestry database

A database carrying forestry data is being created by the Italian national ISAFA (Istituto Sperimentale per l'Assestamento Forestale e l'Alpicoltura) research institute.

This database will become the official database for forest management of the most of the Italian regions.

It combines a huge quantity of alphanumeric and cartographic data.
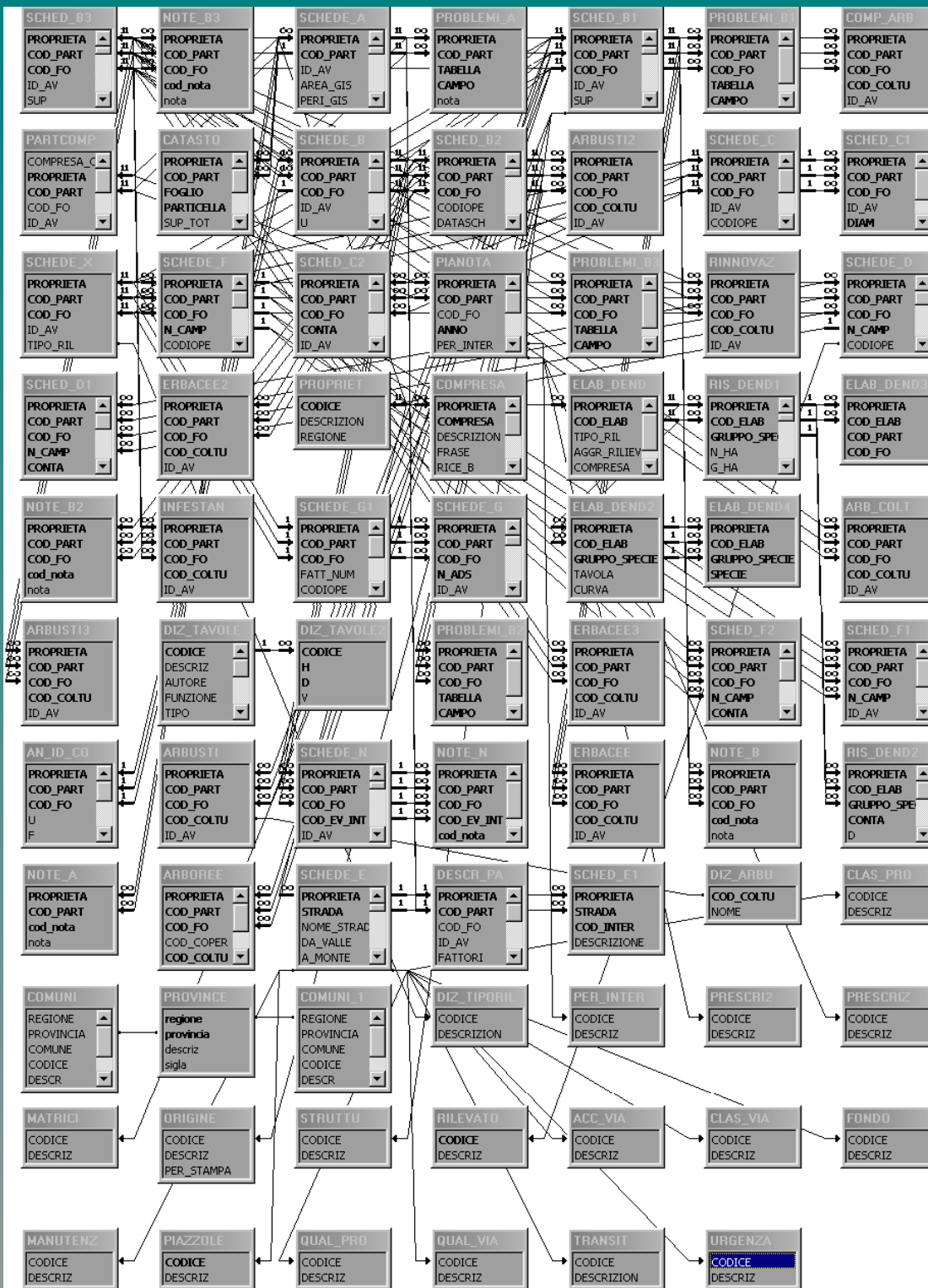
The forestry database

The forestry database is named "Progetto_bosco" and managed by Microsoft Access with:

- 152 tables
- 24 queries
- 105 masks
- 19 reports
- 38 macros

progettobosco gestione sostenibile

Bosco	Elaborazione descrizioni particellari
Descrizioni particellari	Comprese/Classi colturali
Dati catastali	
Rilievi dendrometrici	Elaborazione dati dendrometrici
Descrizioni viabilità	Piano degli interventi

Tavole di cubatura
Dizionari
Strumenti
Gestione stampe

The forestry database: relationships schema

A very complex structure for a huge database

The forestry database: the users

Currently the users of the database are forestry technicians but the idea for the future is to make the users base grow.

Every user must have a MS Access license, the whole database on his PC and at least a basic knowledge of the software. For cartographic data an ESRI ArcView installation is required.

This is expensive because of license fees and personnel training.

Accessing the database

In the current configuration data flow is:
- download the latest available database version to the local PC
- make modifications through MS Access forms
- upload the whole database back to the central repository

This obviously poses a huge problem for database consistency and updates.

The new approach

The database consistency problem can be solved using a client server approach with a central DBMS.
The need of specific software on the client can be removed if the database can be accessed though the web. This is true both for tabular and cartographic data.

The only drawback is the need of Internet connection for each user.

The new approach

This new configuration needs three components:

· Client web
· Web-DBMS interface
· DBMS

Each component can be setup using FOSS software.

The new approach

Two system configurations have been tested.
Both use FOSS for the Web-DBMS interface but the
DBMS is different: PostgreSQL or MS Access.

DBMS	PostgreSQL	MS Access
Pros	powerful system, PostGIS	personnell is already familiar
Cons	personnell training	limitations in data management

The aim of this work

The aims of this work are:

- Migrate the Microsoft Access database to a FOSS one like PostgreSQL (8.1.0)

- Enable users to access and modify database from the web using both proprietary and FOSS server

Migrating from MS Access to PostgreSQL

Many tools were tested to perform an automatic translation of the database but only one has been functional. Tested softwares were:

- html2tabbed.sh and html2pgsql.sh ⟶ work but too manual.

- Access2PostgreSQL ⟶ works but not with this database.

- Access2000Converter099.zip ⟶ PostgreSQL for windows.

- Pgdatapump.zip ⟶ doesn't work.

- Navicat PostgreSQL ⟶ PostgreSQL for windows or on another PC.

⬇

Access2PostgreSQL Pro (free for 10 runs)

Migrating from MS Access to PostgreSQL

With Access2PostgreSQL Pro was made a dump file of the database for PostgreSQL.

Before importing in PostgreSQL some rows of this file were deleted and some typos were corrected.

For the correct interpretation of the latin (accented) characters the encoding of PostgreSQL must be set to 6 corresponding to UTF8.

The dump file was imported in PostgreSQL but not all the table were automatically populated, therefore the data base was completed manually

Migrating from MS Access to PostgreSQL

The manual procedure to complete the PostgreSQL database included the following steps:

- the tables not populated were manually recreated in PostgreSQL, paying attention to columns formats and properties;
- the new tables were filled exporting the tables from Access in xls format and, after some changes, importing the data in PostgreSQL with the COPY command;
- PostgreSQL uses . (point) for decimal number while MS Access uses , (comma), so a substitution was necessary;
- the date format must be modified to YYYYMMDD;
- the boolean values must be translated from Italian to English.

Migrating from MS Access to PostgreSQL

The tables of the database imported in PostgreSQL can be browsed and edited by PhpPgAdmin (4.0 with PHP 4.4.1).

This tool allows the connection to the database but the interface is very different from the original one.

The solution is to create a graphical interface that mimics the MS Access one.

This can be done with HTML and PHP languages with the advantage that the interface is composed of html pages (therefore accessible locally or remotely).

The two database versions

The graphical interface for the database: system properties

- S.O. Windows XP
- Apache 2.0.55
- php 4.4.2
- Microsoft Access 2003

- S.O. Linux Kubuntu
- Apache/2.0.54 (Ubuntu) PHP/4.4.1
- php 4.4.1
- PostgreSQL 8.1.0

The graphic interface for the database

The graphical interface was created as close as possible to the original one.
The main page is written in html and allows the access to other 13 pages all written with php.
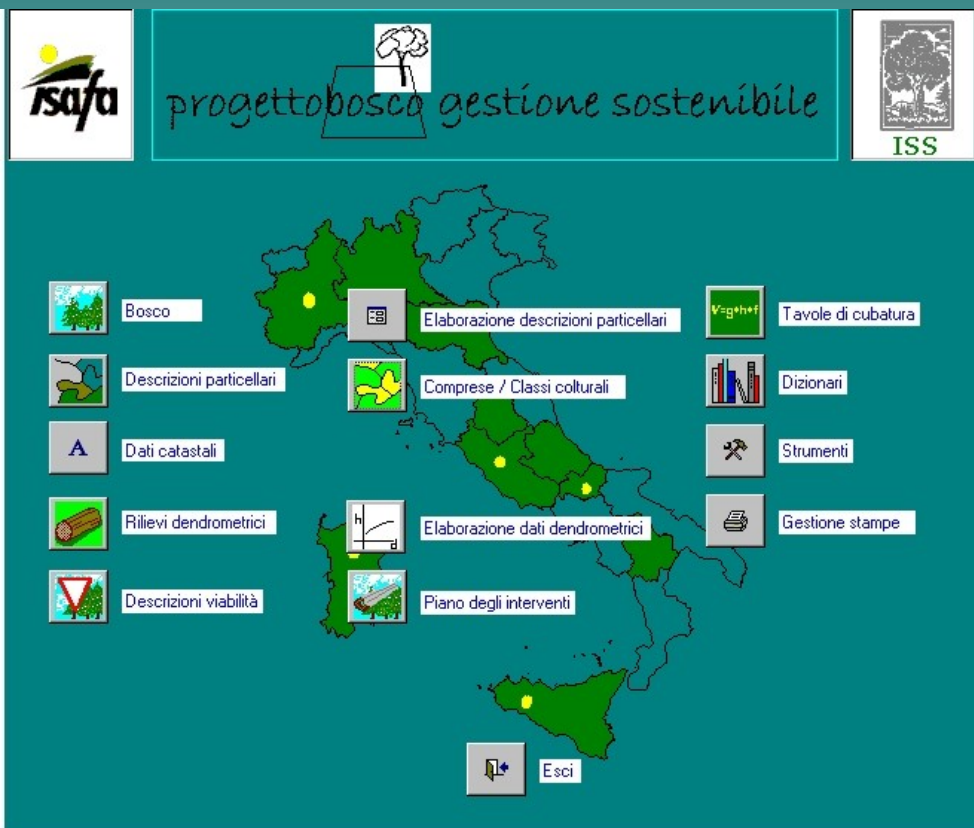
Original main page

New main page

The graphic interface for the database

Existing php functions are used to connect to the database and to browse and edit data.

The php code is different for the two DBMS but the structure is the same so it is easy to adapt the code from one to another.

A particular attention must be given to the name of the columns because PostgreSQL, unlike MS Access, is case sensitive.

The graphic interface for the database

This interface allows an user to access the database with any web browser.
Some examples of the original and the new interface.
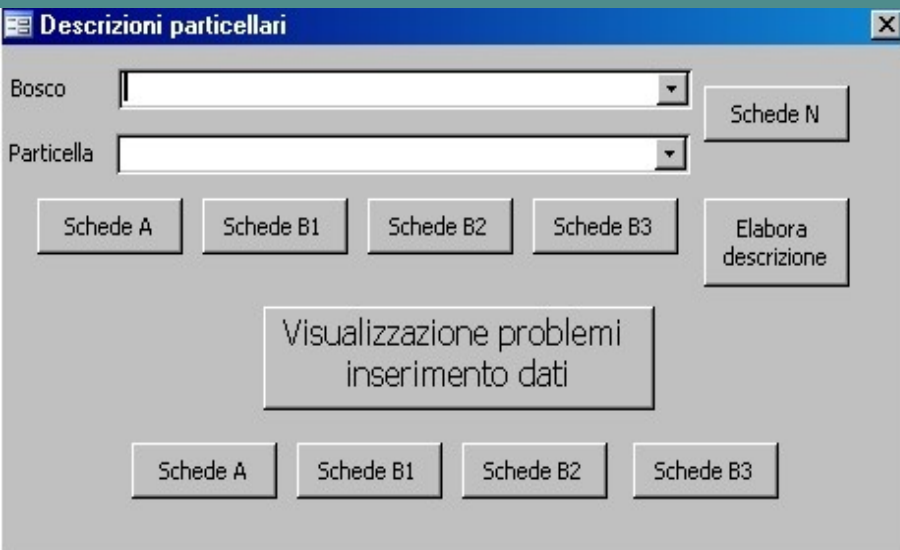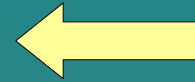

Original mask

New mask

The graphic interface for the database

Regione		Codice	Descrizione
▶	Lazio ▾	12-002	Proprietà Pennazzi comune Soriano
	Abruzzo ▾	13-001	Proprietà Pennazzi comune Amelia
	Molise ▾	14-001	M.Capraro
	Molise ▾	14-002	S. Martino Cantalupo
	Basilicata ▾	17-001	Fossa Cupa
	Basilicata ▾	17-003	Foresta Regionale Rifreddo
	Basilicata ▾	17-006	Pierno
	Basilicata ▾	17-014	Grancia
	Basilicata ▾	17-066	Monticchio
	Basilicata ▾	17-071	Bosco Grande
✳	▾		

Original interface for forest property

Bosco

Regione	Codice	Descrizione		
Lazio	12002	Proprietà Pennazzi comune Soriano	Cancella	Modifica
Abruzzo	13001	Proprietà Pennazzi comune Amelia	Cancella	Modifica
Molise	14001	M.Capraro	Cancella	Modifica
Molise	14002	S. Martino Cantalupo	Cancella	Modifica
Basilicata	17001	Fossa Cupa	Cancella	Modifica
Basilicata	17003	Foresta Regionale Rifreddo	Cancella	Modifica
Basilicata	17006	Pierno	Cancella	Modifica
Basilicata	17014	Grancia	Cancella	Modifica
Basilicata	17066	Monticchio	Cancella	Modifica
Basilicata	17071	Bosco Grande	Cancella	Modifica

Regione Piemonte 01 ▾ Codice [ ] Descrizione [ ] Inserisci

Menù principale

New interface for forest property
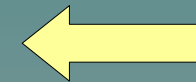
Geographical data – Webgis

Software:

- Apache 2.0
- PHP 4.4.1
- MapServer version 4.8.0-beta2
- Chameleon-2.4-20060427

Data:

- database in PostgreSQL or MS Access format
- shape files

Geographical data – Webgis

The webgis at the moment is a work in progress because the geographical data linked to the database are not available yet. A sample set of geographical data was linked to the database and used to setup the webgis.

The forest unit, the hydrology, the main and forest roads and a technical map in shape or tif format were used to develop the webgis.

The usual webgis tools are available to select and display maps, to zoom, pan and query data.
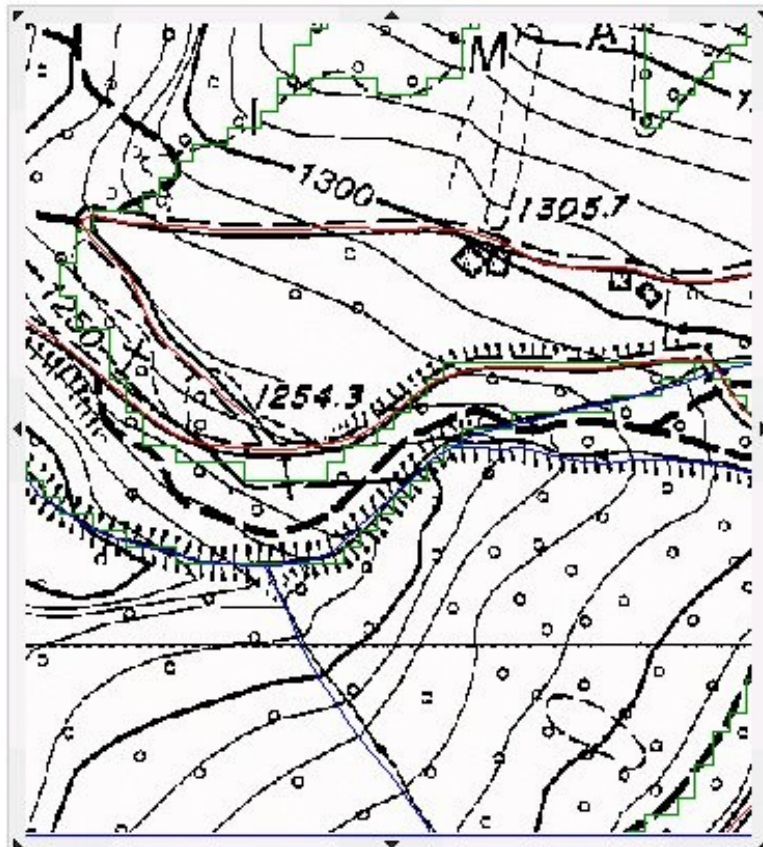
Geographical data – Webgis
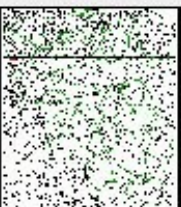
Scheda B per descrivere una formazione arborea

Bosco `Proprietà Pennazzi comune Amelia`

particella/Sottoparticella `27`

Struttura e sviluppo `Ceduo invecchiato`

matricinatura
`Eccessiva`

Origine del bosco `Di origine agamica o ceduo in riconvers.`

Composizione strato arboreo

Specie	Copertura
Acero campestre, Oppio	< 20%
Albero di Giuda, Siliquastro	< 20%
Orniello	< 20%
Carpino nero	>= 20%
Cerro	>= 20%
Leccio	< 20%
Roverella	< 20%
Sorbo domestico	< 20%
Ciavardello	< 20%

Età prevalente accertata `30`

Vigoria
`Mediamente vigoroso`

Vuoti-lacune `Assenti`

Grado di copertura `100`

Densità
`Scarsa`

Strato arbustivo: diffusione `< 5 %`

Specie significative strato arbustivo

Strato erbaceo: diffusione `Nulla`

Specie significative strato erbaceo

Novellame `        ` `        `   Rinnovazione `        `   Specie prevalente rinnovazione `        `

interventi recenti `nessun intervento`   Specifiche `        `

Funzione `Produzione di legname`   Orientamento selvicolturale `conversione ad alto fusto`

ipotesi di intervento futuro
`avviamento`

ipotesi di intervento futuro (secondario) `manutenzione straordinaria viabilita`   Specifiche `        `

priorità e condizionamenti

Subordinato alla viabilità `si`

Done

Conclusions

A FOSS solution is feasible and a prototype has been developed

Data translation from MS Access to PostgreSQL is possible semi-automatically but a manual intervention is still necessary

It has been possible to improve the data base accessibility developing a webgis to display maps

Conclusions

Using this approach it is possible to offer different solutions to access the forest database and to leave the choice of the most suitable solution to the Ministry

The client server approach allows:
- for the client the possibility to use generic web browser
 - for the server to guarantee database consistency and access control