TUTORIAL 10 CLASSES - SPRING 5.5

(Windows, Linux and MAC version)

Introduction to SPRING

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Summary

Synopsis

CLASS 1 – SPRING OVERVIEW

The objective of this class is simply to present the SPRING system to the user. A previously created database **(DF)** will be used for a first contact with the main interfaces of SPRING. The user will have an overview of the data model of many maps and of the drawing area presentation control.

CLASS 2 – READING IMAGES

In this class the image treatment is initiated, for the case of LANDSAT 5 satellite. Since the image to be manipulated is in the TIFF format, the " **Impima**" module of SPRING will be used to read the image, cut it and convert it to the GRIB format.

CLASS 3 – IMAGE REGISTRATION

The aim of this class is to perform the geometric correction of the image that was opened and converted in the last class. In this class the student will define a new **database**, and within it a new **project** that includes the image read by "**Impima**". It will be necessary to inform that this new database will be prepared to work with images, thus we will define a category of the image type. To acquire the control points for the registration we will employ the **keyboard mode**, where some points surveyed in the field will be provided together with their relative positions on the image.

CLASS 4 – IMAGE PROCESSING

After image registration, in this class the student will exercise all the techniques of image processing. The first two techniques (Image Contrast and Pixel Reading) can be exercised using the database created by the user, in case he has completed the two last classes, on the contrary he can use the **Course** database, which already contains some registered images.

CLASS 5 – CLASSIFICATION

In this class the user will learn how to obtain a thematic image starting from methods for the classification of multispectral imagery. As for the segmentation method it is suggested that small areas be used before performing it over the image of the whole project, since depending on the project that could take hours of processing. On this class it is presented how to proceed to create a mosaic with the images of adjacent regions.

CLASS 6 – RADAR IMAGE PROCESSING

The objective of this class is to exercise some techniques for the treatment of radar imagery. Some radar images are already available in some specific projects within the **Course** database.

CLASS 7 – VECTOR DATA MANIPULATION

In this class the vector data structure of SPRING is presented to the user. Thematic maps will be created via the importation of line files in the ASCII format. In some maps (use and soil) the user will need to use the editing tools of the system. The user will also see how to convert from vector to raster the thematic Information Layers (IL's) edited, and thus being able to compare both representations.

CLASS 8 – NUMERIC MODELING

The aim of this class is to introduce the user to the data manipulation of the numeric model of SPRING. A map containing the samples (contour lines and spot heights) has already been edited, together with the rectangular and triangular grids generated. The user will be able to test the importation and generation of grids in another IP, by performing the importation of contour lines/spot heights in the DXF format, although for an area smaller than the project's one. However, to obtain some products he can use the grid already available in the IP "Altimetry_map".

CLASS 9 – ANALYSIS AND SPATIAL QUERY

In this class the user will learn how to edit a cadastral map from the manipulation of objects. Over this map the querying mechanisms will be presented (by pointing, by attribute, by grouping, and by

tables). Some map algebra analysis and programming tools (the LEGAL language) are also presented.

CLASS 10 - GENERATION OF A MAP AND PRINTING

The objective of this class is to generate a map to be printed. Any of the IP's created in the previous classes can be used.

What is necessary to follow the lessons of this tutorial?

- Install SPRING;
- Install the data for the practical classes.

SPRING Installation

Windows version

- **Double click the file** "**Spring-5.5.3-English_x86.exe**". Click next and will be presented the license agreement. Click I Agree and the components to be install will be shown; Spring 5.5.3 English ans Database, click next. The directory *C:|Program Files|Spring553_English* will be suggested to install the software. Click Install.

Linux version

- **Download them from the internet save on diretory ~:**
  - command cd ~ # the symbol ~ stands for the user directory on linux
  - Command **tar -zxvf Spring5.5.3-Eng-<linux>.tar.gz** ➢ **To download the content from the internet:**
  - Access the page bellow and save the file on the desired location:
    http://www.dpi.inpe.br/spring/english/download.php

    To execute Spring applications :
    . comand cd {install directory} Default ~/ Spring 5.5.3 - Eng-<linux>
    . command ./s_spring

Mac version

- **Download them from the internet save on diretory ~:**
  - Double click on the file *spring-5.5.3-english.dmg*
  - Wait to mount a disk on the Desktop
  - Double click the mounted drive
  - Copy the *Spring 5.5.3 EN* file to the Applications folder

- To execute Spring applications :
  - Click on the Launchpad icon located in the dock
  - Click the *Spring 5.5.3 EN* icon
  - or
  - Go to /Applications folder
  - Double click the Spring 5.5.3 EN icon

=> Install SPRING:

Windows version:

You should install in your computer, the data needed to execute the set of classes hold on that guide book. The file "**tutor_10classes_55.exe**" (to windows version) can be acquired through the internet on the following address: www.dpi.inpe.br/spring/download/springdb/tutor_10classes_55.exe

- Double click the file "**tutor_10classes_55.exe**". The folder **c:\Tutor_10classes** will be proposed to install the data. Click **Next** on the dialog files that follows.

After the installation of Spring on Windows:

After installing the data, you should be able to find on your computer the following folders/directories, on **<drive/local_destination>\Tutor_10classes**:

- **springdb\Course** (corresponds to an already processes database)
- **springdb\DF** (corresponds to an already processed database)
- **springdb\Urban** (databank with an IP to query)
- **Data** (files to be imported)
- **Images** (images to be registered and imported)
- **Legal_programs** (programs to be edited and executed with LEGAL)
- **Reports** (to save reports)
- **PDF_tutorial** (theoretical chapters and exercises in PDF format – only if installed)

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Linux Version:

You should now install in your computer the data to execute the set of classes hold on that guide book. The file "**tutor_10classes_553.tar.giz**" (Linux version) can be acquired through the internet on:
www.dpi.inpe.br/spring/download/springdb/tutor_10classes.tar.gz and must be saved on "~/" diretory.

Command **cd** ~

Command tar -zxvrf ~/inst_spring/Tutor_10classes_553.tar.gz

After SPRING installation on Linux:

The SPRING will be installed on a patronized location:
/usr/local/Spring-5.5.3-Eng/

The course data will be installed on the folder ~/tutor_10classes/
on that file will be found the following directories:

- **springdb\Course** (corresponds to an already processes database)
- **springdb\DF** (corresponds to an already processed database)
- **springdb\Urban** (databank with an IP to query)
- **Data** (files to be imported)
- **Images** (images to be registered and imported)
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- **Reports** (to save reports)
- **PDF_tutorial** (theoretical chapters and exercises in PDF format - only if installed)
-

Basic commands on Linux

- Use **tab** to auto-complete the comands
- **ls**: list the files and directories on the folder
- **cd directory**: goes to a directory
- **pwd**: shows the hole directory that you are in
- **mkdir directory**: create a directory
- **rmdir directory**: destroy and empty directory

- **rm file** : erase a file
- **mv source destination**: move file or directory from source to destination
- **man <command>**: help on the last command
- **cp source destination**: copy file or directory from source to destination
- **su**: goes to **"superuser"** (Executed during the program installation)
- **tar**: program utilized to gather multiple files in one only

  tar –cf file.tar foo bar # Creates the file "file.tar" with the foo and bar files

  tar-zcf file.tar.gz foo bar # Creates the file "file.tar" compressing th foo and bar files

  tar-tvf file.tar # Lists all the "files.tar"

tar –xf file.tar # Extract all the files of "file.tar" **tar-zxf file.tar.gz** # Extract while decompress all the files from "file.tar.gz"

- gzip file: compact a file
- gunzip file: decompress a file
- rpm: Install distribution programs packages

  rpm –ivh file.rpm # Install RPM file package

  rpm-uvh file.rpm #Update RPM file package

  rpm –q package # Verify if the package was installed rpm –e file # Remove package

➢ Command Syntax

In this tutorial sequences of standard procedures are used to describe the operation in the various windows of the system. The procedures for the execution of the practical exercises follow the following syntax:

Þ ***Describes a sequence of operations:***

Command to be executed from the Start menu of Windows

Example: *# Start → Programs → Spring → Scarta*

[Function] – option from the menu bar or button from the toolbar.

Example: – [File] [Database...] or button 

{Name: **Name to fill in**} – name of a field to fill in.

Example: {Name: **Course**}

{Field – Name: **Name to fill in**} – name of the specific field to fill in.
Example: – {Thematic classes – Name: **Main**}

{Field – Name1: **Name1 to fill in,** Name2: **Name2 to fill in**} – name of the fields.
Example: – {Bounding Box – X1: **183000**, X2: **195000**, Y1: **8745000**, Y2: **8780000**}

(Button) – Button to press.
Example – (Create)

(Field ⇔ Button) – Button of a specific field to press and select.
Example: – (Management – SQLite)

(List | Element) – Element of the list to select.
Example – (Database | Course)

(List | Element1, Element2, Element3...) – Elements of non-exclusive list to select.
Example – (Images | band1, band2, band3)

Window – active command window to be operated.
Example – **Database**

*****_Load IL on the Panel_ – Comment or description of a procedure to be executed

Shortcut buttons, such as Database  , are available only on the toolbar.

Mac Version:

You should now install in your computer the data to execute the set of classes hold on that guide book. The file "**tutor_10classes_553.zip**" (Mac version) can be acquired through the internet on:
www.dpi.inpe.br/spring/download/springdb/tutor_10classes.tar.gz and must be saved on "~/" diretory.

Command **cd** ~

Command tar -zxvrf ~/inst_spring/Tutor_10classes_553.zip

After SPRING installation on Mac:

The SPRING will be installed on a patronized location:
/Applications/Spring 5.5.3 EN

The course data will be installed on the folder ~/tutor_10classes/
on that file will be found the following directories:

- **springdb\Course** (corresponds to an already processes database)
- **springdb\DF** (corresponds to an already processed database)
- **springdb\Urban** (databank with an IP to query)
- **Data** (files to be imported)
- **Images** (images to be registered and imported)
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➢ *Basic commands on Linux*

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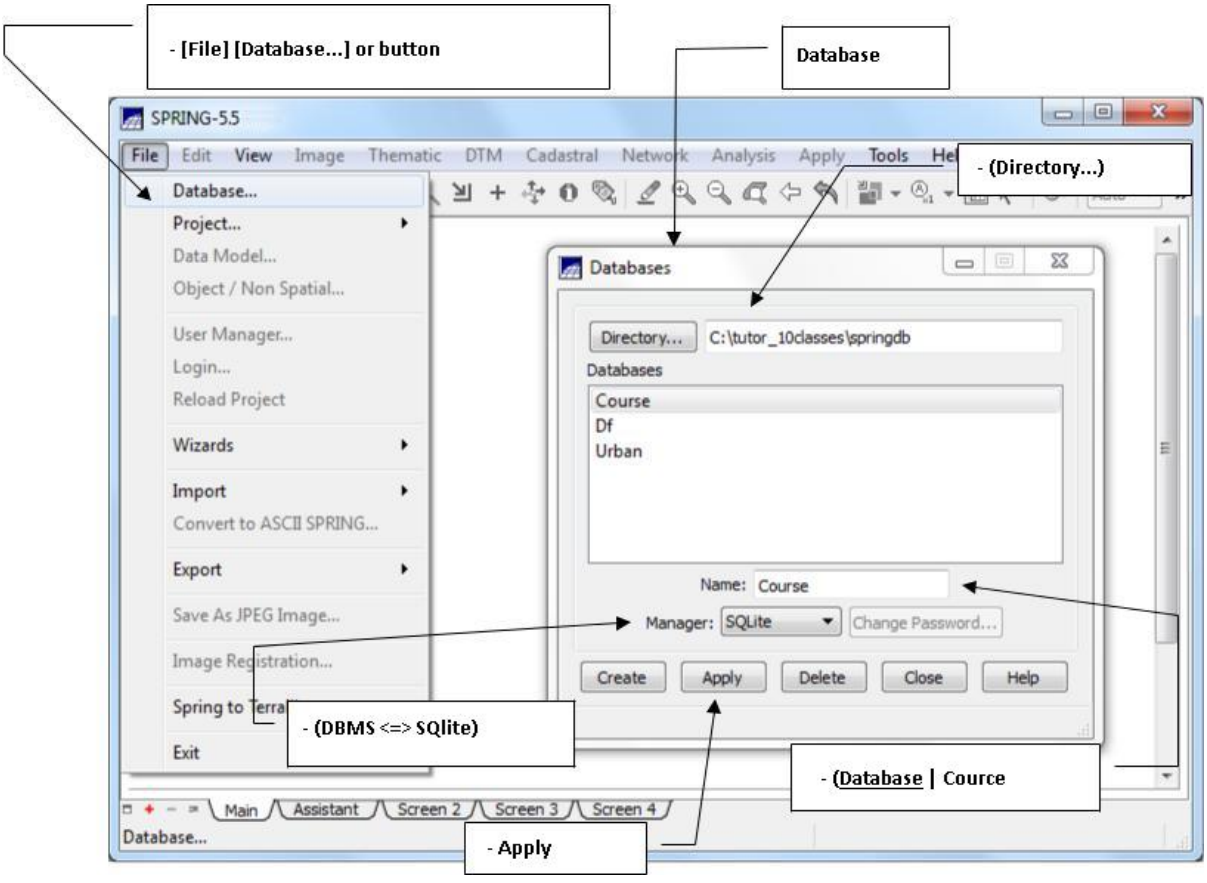
Following, see an example of procedure on the **Database** window:

- ***Starting SPRING and creating a database:***
  - *#Start →Programs →<version><language> - Spring <version><language> Windows*
  - *#On Linux: Command to be typed on the console (Shell) - # s_spring*

  - [File] [Database...] or button 

    Database
    - (Directory...) *select the path C:|Tutorial_10classes|springdb*
    - Windows ~/Tutorial_10classes/springdb - Linux
    - {Name: **Tutorial**}
    - (DBMS Û SQLite)
    - (Create)
    - (Database | Course)
    - (Apply) - *answer **Yes** if you have another active Database/Project*



Class 01 - SPRING Overview

1 System presentation

The SPRING (Georreferenced Information Processing System) is a geographic database of the second generation, for UNIX and Windows environments with the following characteristics:

- Works as a frontierless geographic database that supports a great data volume (with no limitations of scale, projection or time zone), keeping the identity of the geographic objects throughout the whole database;
- Manages both vector and raster data, and integrates Remote Sensing data in a GIS;
- Provides a powerful and user-friendly work environment through the combination of menus and windows with a spatial language that is easily programmable by the user (LEGAL - Algebra Based Space-Geographic Language);
- Completely scalable, can work with all of its capabilities in microcomputers or high-performance RISC workstations.

SPRING is based on an object-oriented data model from which its menu interface and the LEGAL spatial language are derived. Innovatory algorithms, like the ones used for spatial indexing, image segmentation, and the generation of triangular grids guarantee the adequate performance for the many different applications. Designed for the RISC platform and the OSF Motif standard graphic interface, SPRING presents a highly interactive and friendly interface, besides an online documentation which provide for the ease of use and support for the user.

Another extremely important feature is that the database is unique, that is, the data structures are the same regardless of the platform the user is working on, be it a microcomputer or a RISC machine, there is no need for data conversion. The same applies to the interface, which is exactly the same, so there is no difference in the operation of SPRING.

Based on these characteristics SPRING has presented itself as an extremely attractive alternative in the geoprocessing field, for it is a public domain software, that can be acquired from the internet (http://www/dpi.inpe.br/spring) after filling in some form on the webpage.

SPRING is a product developed with Brazilian technology by the National Institute for Space Research of Brazil, in the city of São José dos Campos. This city stands out in Brazil for its technology companies and institutes mainly from the aerospace sector.

2 SPRING Databases

A SPRING database physically corresponds to a directory where will be stored the definitions of Categories and Classes, as well as the projects that belong to that database. The projects are kept in subdirectories together with their data files: points, lines, orbital and aerial images, thematic images, text, grids, and objects. Only one database can be loaded in a work session.

Note: You can configure SPRING to automatically load the last database that was used, or the same database always. You can also

modify the interface to the classical model (version4.3). See some more details on the Environment Configuration option of the Tools menu.

Following you will see how to load and analyze a database that is already modeled and with many information layers in a project over the downtown ("Plano Piloto") of Brasilia.

Þ ***Activating a database:***

– *#Start → Programs → Spring <version><Language> – Spring <version> <Language>*

– [File] [Database…] or button 

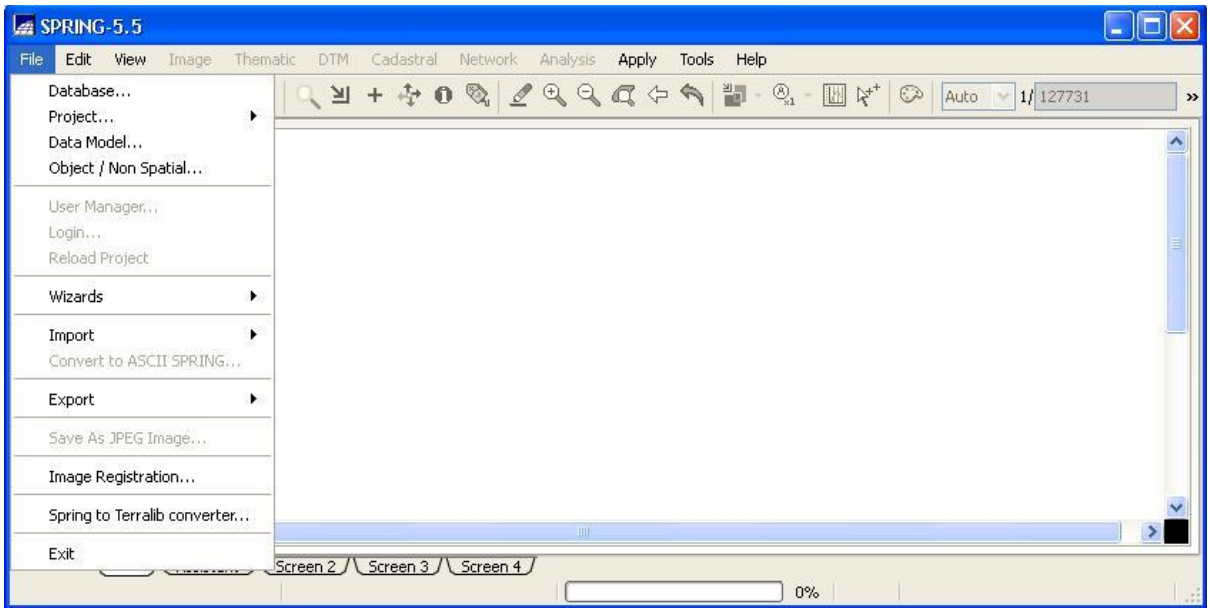
Database

– (Directory…) *select the path C:|Tutor_10classes|springdb (windows) or ~/tutor_10classes/springdb (Linux)*

– (Database | DF)

– (Apply) – *answer **Yes** if you have another Database/Project loaded*

The figure below presents the main window of the "Spring**" module. Note: that all the functions are accessed via menus, or the toolbar.*



3SPRING data model

Before introducing any data in SPRING it is necessary to create/define the Data Model in the active database, for each map

will belong to a certain Category (one only Model) that is: **Thematic**, **Numeric**, **Image**, **Network**, **Cadastral**, or **Object**.
The characteristics of visual presentation (**Visual** of areas, lines, points and texts) of the maps are also defined and stored together with the Model of the Database.

The user does not need to define all the categories from the beginning, because many times we don't know everything that will be needed to achieve our objective. At any moment we can add or define new categories. Only the categories in the **Thematic** model are divided in **Thematic Classes**, and each class can have a different visual, for example: different colors for each type of soil.

Þ ***Analyzing the data model of the Course database:***

- [File] [Data Model...] or button 

Data Model
- (Categories | TM_Image)
- (Categories | Altimetry)
- (Categories | Land_use)

** Observe that each category belongs to one of the models. Only the thematic category is subdivided in classes.*

- (Thematic Classes | Cerrado)
- (Visual...)

Setting Visual Parameters
- (Areas | SOLID, HASH, etc...)
- (Color...)

Color Selection
- Select a color
- (OK)

** see also the visuals for Lines, Points, and Texts.*

- (Close)

Data Model
- (Close)

Note: When changing the visual of a class of any geographic entity, represented in one or more IP's of the same or another project, within the same database, it will reflect the change made.

4Projects

A project really defines the physical work area. A name, a projection, and a Bounding Box must be provided in order to create a project. A subdirectory below the database directory will be created, and all the data about a certain region will be stored there. The requirement to create a project is only the availability of an active database, there is no need to define the categories. You can have as many projects as you like, but only one can be active at a time.

A **Project** has a set of **Information Layers** (**ILs**) with a same **projection system**. External data in other projections will always be reprojected to the projection of the active project, either during the importation or the digitalization. That leads to the importance of defining a system that is adequate to the scale/resolution of the layers, also foreseeing the cartographic products that will be generated.

Note: A project in a database is automatically loaded after having been loaded in a previous session. The Spring keeps track of the last project that was used. More detail can be obtained on the Environment Configuration option of the Tools menu.

Þ ***Activating a Project:***

- [File] [Project…] or button 

Projects

- (Projects| Brasilia)
- (Projection…)

Projections

- (Systems | UTM)

**Note: that you can choose one among thirteen projections. Depending on the choice some other*

parameters should also be defined, like ***Hemisphere****,* ***Latitude*** *and/or* ***Longitude of Origin*** *and* ***Standard Parallels****;*

- (Close)

Projects

- (Coordinates ⇔ Geographic or Plane)

**Note: that a project can be defined in Plane coordinates (meters) or Geographic coordinates (degrees, minutes, and seconds).*

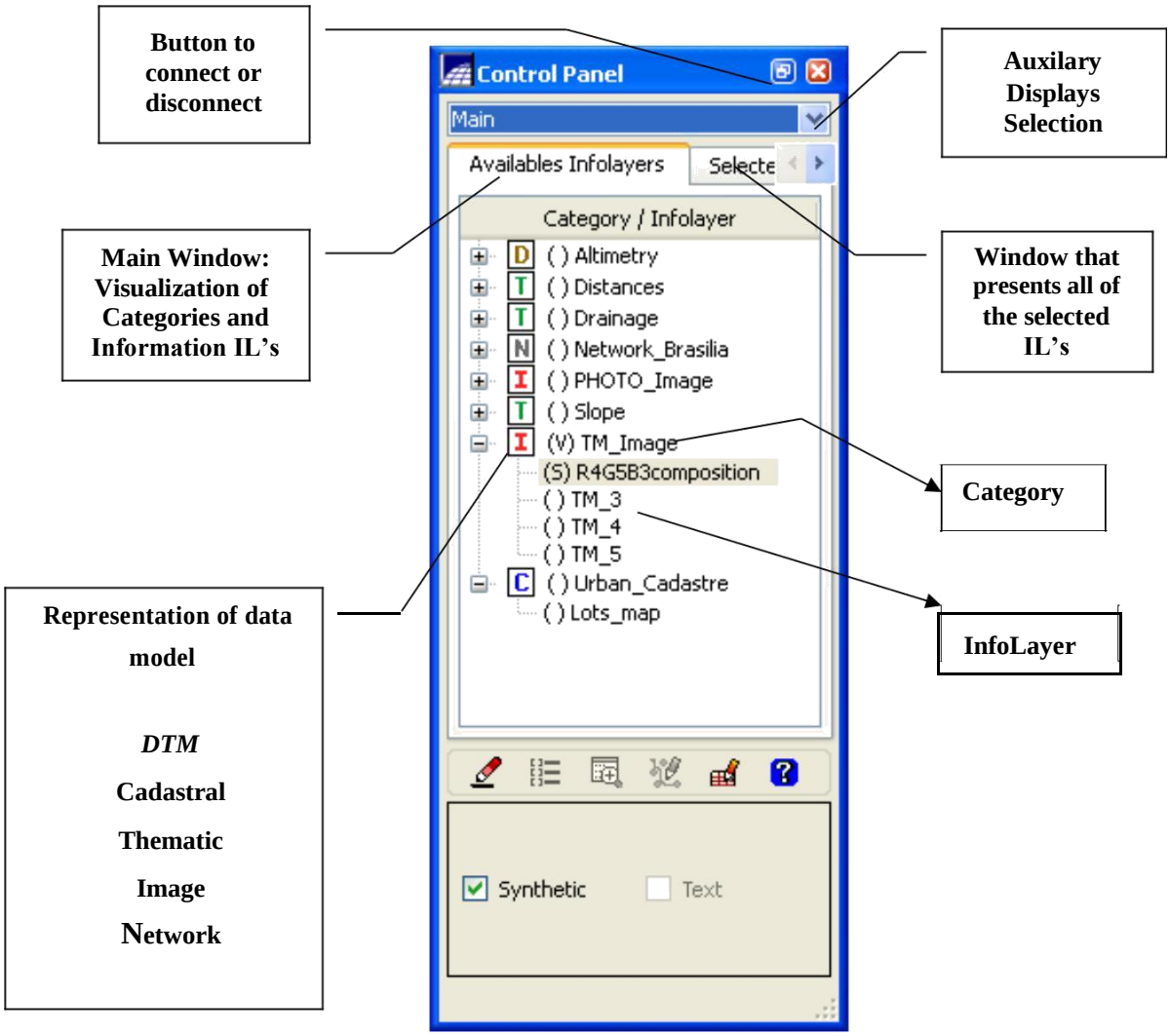
- (Load)

Note: The "**Control Panel** " window is presented to the user together with the main window of Spring when you load a Project, and it is in this window that you make the data selection and control the visualization displays.

5 ILs Visualization

It is through the "Control Panel" window  (figure below) that the Information Layers and their different representations are selected both for the visualization and for some desired operation. The Control Panel can be adjusted or not to the main window of SPRING: to do so, just click the button  (when adjusted on the main window) or  (when it's floating) of the window itself, as the image below shows

To select an IL on which some operation should be performed it is necessary to load it first, or even, depending on the operation, it could be necessary to present it on the active display. So use the list of the "**Control Panel**" that presents in hierarchy the **Categories** and **Information Layers (Infolayers)**.



Categories – only the categories of the active database that have at least one Information Layer in the active project are presented. The categories are located on the top of the hierarchy of each Information Layer and are identified with an icon that represents the first letter of it's Data Model. According with the category, Info-Layers are presented and their possible representations. The spaces "( )" side by side with the categories will be marked with "(V)" when any IL from that category is selected.

Info -Layers – On the possible IL's window of the Control Panel, they are presented according to the Category selected above; on the "Selected" window are presented only the IL's that had been selected. When an IL is selected, its possible representations are presented in the bottom of the Control Panel window.

After selecting an **Infolayer** (**IL**) the functions to operate on that IL become available in the menu bar of the main window. Depending

on the operation it's not necessary to visualize the data; the selection only, should be enough to operate on the active IL.

Note: the active IL is not necessarily the one that is being shown in the drawing window. We can have many IL's presented on the display but only one of them is active. The active IL is the one that is selected in the list " **Information Layers**" of the panel and on the status bar (right side) of the main window.

Þ *Visualizing a monochromatic image in the main display:*

- [View][Control Panel] or button 

Control Panel

- (Categories | TM_Image)
- (Information Layer | TM_5)
- (M) *will visualize in gray levels. Note: if the IL is selected.*
- (Assistant screen) automatically active
- (Categories | TM_Image)
- (Information Layer | R4G5B3composition)
- (Synthetic) *will visualize this image in color. Observe if the IL is selected*.

Note: compare the two images. In the main display 1 we have a map of the type image (monochromatic) in gray levels, reflecting the different targets on the scene. Brighter levels represent targets that have the property of reflecting more sunlight, for example, areas where there is no vegetation cover. The black levels represent the water body of the Paranoá Lake in Brasilia. In auxiliary display we have the same image but a synthetic one in three bands that were coded.

Þ *Visualizing a color composition (RGB) in the main display:*

Control Panel

- (Main Display)
- (Categories | TM_Image)
- (Information Layer | TM_3)

- (R) *will visualize the IL in the red LookUp Table (LUT).*
- (Information Layer | TM_4)
- (G) *will visualize the IL in the green LookUp Table (LUT).*
- (Information Layer | TM_5)
- (B) *will visualize the IL in the Blue LookUp Table (LUT).*

will visualize the IL in the blue LookUp Table (LUT).
**In this image the pixels in each band (monochromatic) are associated to the LUT (electron gun pf the basic colors RGB).*
**Experience trying some other composition like, for example: TM_3 in B, TM_4 in R, and TM_5 in G.*
**unselect all the IL's that might be select when you are finished.*
A double click over the category unselects all of its IL's.

Þ ***Visualizing an aerial photo in the main display:***

Control Panel
- (Main display)
- (Categories | PHOTO_Image)
- (Information Layer | Aerial Photo)
- (M) *will visualize the IL in gray levels. Check if the IL is selected.*

**Note: that this image occupies an area (Bounding Box) smaller than the last, but its resolution is higher.*

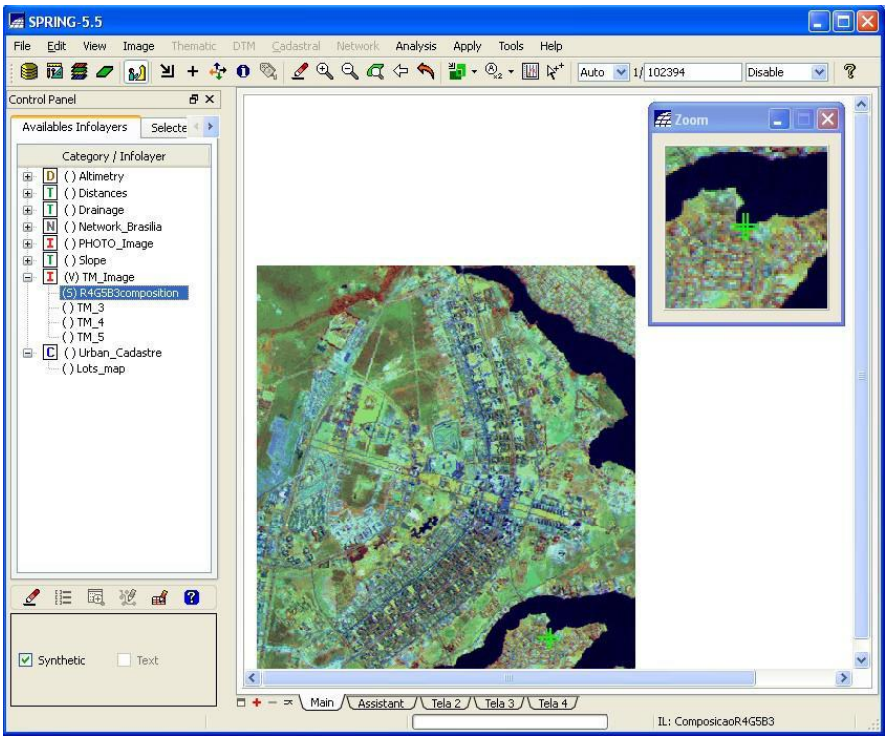
Note: Besides the Main Display represented by the main window of the **Spring** module, four other visualization displays are available: Auxiliary, **2, 3** and **4.** The Auxiliary Display is specially reserved in the image registry for the presentation of the image that will be corrected. The activation and switch of the displays are made by clicking on the relative "pages" presented at the bottom of the active screen (see the image below). Each display has it's own Control Panel, which is activated simultaneously with the display. To insert a new auxiliary display, just click on the button . To float any of the screens just click on the "Right Button > Float", or click on . To adjust once again one of the auxiliary displays to the main page, just click on the button on the bottom of the window as the image below shows.

Note that when the Control Panel (CP) is adjusting the main window, each auxiliary display, is followed by an own Control Panel, but in case they are floating there will be a single Control Panel for all the displays.

Zooming in the Drawing Area

Provided that you have one or more IL's presented in any of the five displays, you can zoom in what you see in another window. In the "Tool Bar" use the Zoom button  options to zoom in **2**, **4**, or **8** times the data that is in the drawing area. Move the cursor over one of the displays and you will have the content under it increased in size, according to the option you made.

Note: This feature of zooming in is very useful when you want to determine with greater precision the location of the control points in the image registration process.



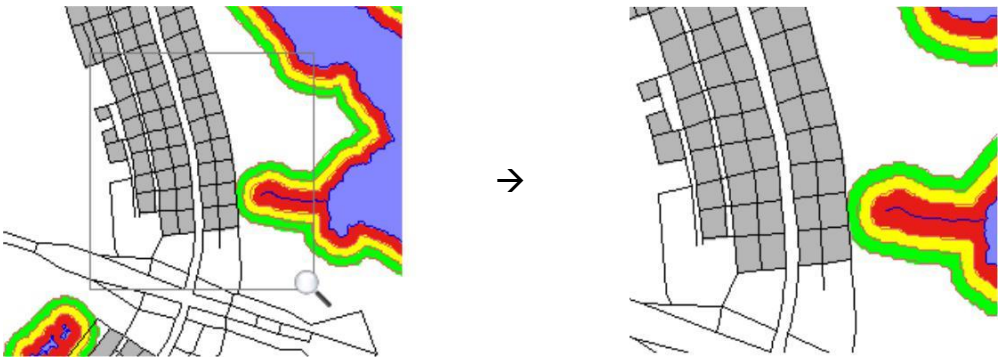
Zoom Cursor

The **Zoom Cursor** (zoom) is used to define regions of the drawing area to be zoomed in. The zoom is enabled when this button is loaded . Two points are needed to define the zoom area, the **upper left corner** and the **lower right corner**.

Procedure to perform a zoom:

Þ ***Zooming in the drawing area:***

1. **Activate** the **Zoom Cursor** in [View][Zoom Cursor] or . **Click** the mouse over the drawing area to define the **upper left corner** and move it to the desired **lower right corner**.
2. **Click** again over the **lower right corner** to define the zoom area.



Area Cursor

The area cursor can also be used to define regions to be enlarged (zoom) on the draw area, but its main function is to select regions for some specific Spring application, i.e., define the bounding box for clipping an infolayer (IL). The cursor is enabled when this button is active or the mouse is in the format of an arrow pointing to the lower right (⇲). Two points are needed to establish the selection area, the upper left corner and lower right corner.

The procedure to select an area requires 4 main steps:

Selecting an area using the cursor Area:

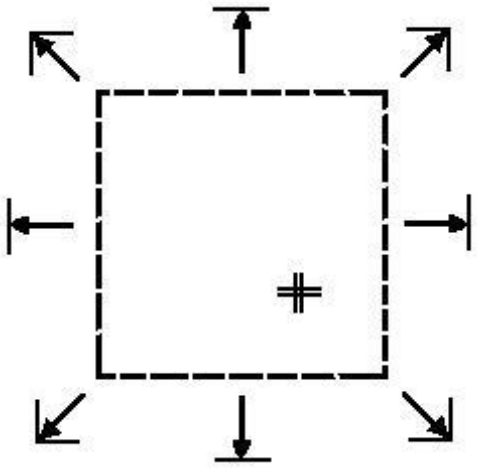
1. Activate the Cursor in Area [View] [Cursor Area] or. Notice that the cursor is in the normal way (↖) for mode (↘).

2. Click the cursor on the draw area to set the first point (upper left) and move into position;

3. Click again to set the second point (bottom right);

Note: To disable the zoom cursor and go back to the normal mode, just **click** over the **Zoom Cursor** in the toolbar  or [View][Zoom Cursor], or else, click with the middle or right mouse button inside the drawing area.

Once a zoom area has been defined (dotted rectangle) it can be modified, before [Execute][Draw]. Clicking on any of the sides or corners of the rectangle allows us to resize it (see the eight possible points on the figure below). A second click is needed to anchor the side or corner on its new position.



The zoom area can still be moved to a new position by simply clicking inside the defined rectangle, moving the mouse pointer to the new position and clicking again to anchor it in its new position.

Visualization Displays

The visualization displays or drawing areas are controlled from the **Control Panel** in both their existence as well the data that is shown there. The features of the drawing areas are presented below.

To the right of the status bar of the displays a message specifying which Information Layer is active is presented. That defines which IL will suffer the effects of the operations, whether it is or is not being shown in the display. On the left the **geographic** or **plain coordinates** of the cursor position is presented, in case it is enabled.

The IL's selected can be seen on the Control Panel of each active Display, and the marks "(V)" on Categories and IL's indicate which IL's and representations are selected.

Modes Auto/Full/Scale

The presentation of IL's in the drawing area can be controlled by other parameters that are defined for each display. In the toolbar there is a combo box that allows choosing among: **Auto**, **Full**, and **Scale**. See the effect of each of these options:

- **Auto** mode: the SPRING resamples the image in such a way as to present it fully within the limits of the display, of the active project or the rectangle defined for a zoom.
- **Full** mode: there is no resampling, all the pixels are presented and if the image does not fit inside the dimensions of the display, a scroll bar can be used to visualize de rest of the image.
- **Scale** mode: the data will be presented on the display in the scale defined in the appropriate field, requiring only the value to be typed. A message will warn the user in case there is not enough memory to allow the zooming in of the image to the scale requested. In this case, the zooming scale should be reduced. The text box presenting the scale in each visualization cannot be modified unless the option **Scale** is selected.

Note: When clicking in [Execute][Reset] or the button  in the active display, the presentation mode returns to **Auto**.

Presentation of coordinates and information for raster data

Once your project has been cartographically defined the position of the cursor in geographic or plane coordinates can be seen in real time when you move it over the drawing area.

Use the combo box **Disabled/Planes/Geographic/Info** in the toolbox. The coordinates are presented in the status bar, in meters for the **Planes** option, and in degrees, minutes, and seconds for the **Geographic** option. The option **Disabled** disables the presentation of the coordinates in the status bar.

The **Info** option presents the values of Z when a numeric IL contains a rectangular grid or the gray levels in an IL of an image model.

Draw, Zoom In, Zoom Out, Zoom IL, Previous, and Reset

The Draw button  or [Execute][Draw] in the main menu updates the data in the display according to the selection that has been done in the **Control Panel** and the characteristics of the presentation, like scale, defined in the display itself. It must be loaded after each new selection, after a change in the visualization parameters, the edition of data, and after defining a zoom area with the cursor.

The **Zoom In** button  or [Execute][Zoom In] in the main menu will enlarge 2 times the center of the drawing area after the selection of IL's in the **Control Panel**.

The **Zoom Out** button  or [Execute][Zoom Out] in the main menu reduces 2 times the size of the drawing area from the center after the selection of the IL's in the **Control Center**.

The **Zoom IL** button  or [Execute][Zoom IL] in the main menu enlarges the data in the display according to the active IL in the Control Panel, based on the Bounding Box of the IL. Other IL's can also be selected but the action will take effect only upon the active IL.

The **Reset** button  or [Execute][Reset] in the main menu resizes the data presented according to the display size and the Bounding

Box of the active project. It undoes a zoom that has been applied through the **Zoom Cursor** and restores the presentation mode to **Auto,** in case it was **Scale** or **Full**.

The **Previous** button  or [Execute][Previous] in the main menu restores the last action of presentation of the data in the current display. It undoes the last zoom performed through the **Zoom Cursor**, **Zoom In**, **Zoom Out**, **Zoom IL**, or **Flight Cursor**.

Fly over the drawing area

The flying feature of the button  or [View][Roaming Cursor] in the main menu, allows to move the data in the display keeping the visualization scale, in order to show the data that lies beyond the visible area on the display. It is normally used after applying a zoom in the active display. The cursor changes into the shape of a pointed cross  while the flying feature is active. Click on a point on the display and drag the mouse to the desired position, releasing it in order to show the image in its new position. To restore the cursor to its original arrow click the right mouse button inside the drawing area or over the flight button itself.

Information about the drawing area

The use of the button  or [View][Info Cursor] in the main menu shows all the information about the IL's drawn in the active display. By activating that button the cursor changes into the shape of a cross (+) and when the button is clicked over the active display all the information about the position of the cursor are presented on the "Data Report" window. To restore the cursor to its arrow shape just click again over the info button or click the right mouse button on the active display.

Following you will see the visualization of other data models.

- *Visualizing a river thematic map on the main display:* **Control Panel**

- (Main Display)
- (Categories | Drainage)
- (Information Layer | River Map)
- (Lines), (Classes)
- (Draw) or - [Execute] [Draw] or the button  *in the main menu*.

Note: Observe that in display 1 we have some lines and polygons (Lake Paranoá).

Þ ***Visualizing a thematic map of declivity on the main display and Legends of the classes:***

Control Panel
- (Main Display)
- (Categories | Slope)
- (Information Layer | Slope Map)
- (Raster)
- (Draw) or - [Execute] [Draw] or the button  *in the main menu*.
- [View][Legend…]

Legend
- (River Map) - *over the triangular button*.
- (Slope Map) - *over the triangular button*.

Note: Note: that now you have the thematic map of the classes of declivity filling in the whole project area, where each color represents a certain range of values (ordinal).

Þ ***Visualizing a numeric map of altimetry on the main display:***

Unmark every IL that is selected before starting. A **double click over the category unmarks all its IL's.*

Control Panel
- (Main Display)
- (Categories | Altimetry)

- (Information Layer | AltimetryMap)
- (Samples), (Texts)
- (Draw) or - [Execute] [Draw] or the button  *in the main menu*.

Note: Observe in display 1 that we have contour lines and some spot heights. To each graphical entity we have an elevation Z associated, besides the XY coordinates of each spot height and contour line.

Þ ***Visualizing a cadastral map on the main display and its attributes:***

Unmark every IL that is selected before starting. A **double click over the category unmarks all its IL's.*

Control Panel

- (Main Display)
- (Categories | Urban_cadastre)
- (Information Layer | Block_map)
- (Lines), (Objects), (Texts)
- (Draw) or - [Execute] [Draw] or the button  *in the main menu*.
- [Edit][Object...]

Object Edition

- (Object Classes | Blocks)
  - (Selection Mode Û Screen)

**click over any of the blocks in the active display and observe its Legend*

  - (Attributes...)

Attributes Values

**Click over other blocks and observe its attributes (Wing, Population, Income, etc...) presented in the values list.*

  - (Close)

Object Edition

- (Close)

Note: Observe that each polygon is associated to an individual geographic object, that is, each one has a specific Legend and name, besides descriptive attributes.

Þ ***Visualizing a network map and its objects on the main display:***

Unmark every IL that is selected before starting. A **double click over the category unmarks all its IL's.*

Control Panel

- (Enable Û Display 1)
- (Categories | Network_Brasilia)
- (Information Layer | Network Map)
- (Lines), (Objects)
- (Draw) or – [Execute] [Draw] or the button  *in the main menu*.
- [Edit][Object…]

Object Edition

- (Object Classes | Roads)

click over any of the lines (roads) that are in **red in the active display. The lines in **black** are not associated to any object.*

- (Close)

Note: Observe that we have only entities of the **line** and **node** types (extremities and line crossings) and, when associated, descriptive attributes.

6Exit SPRING

To exit SPRING the user does not need to worry about saving his data, that is, the information layers that were being edited are automatically saved. Only auxiliary files, like the context file for a classification and control points for a registration do require a **Save** file action.

Þ *Exiting SPRING:*

SPRING

– [File][Exit]

**Confirm with a YES to the question, if you really want to close SPRING.*

**The environment variables SPRINGPROJ and SPRINGDB are updated when you close the application, making the same database and project be loaded when you next open SPRING again.*