Contents

1 Important information to start with

1.1 Reading conventions

This document follows the following reading conventions:

- **bold** is for emphasizing notes and reminders.
- `verbatim` is for representing code snippets and commands, keys and file names.
- `Ctrl` and `Cmd` represent the "Control" and "Command" keys, respectively. The former is avaible on Windows and Gnu/Linux platforms and the last one is available on Mac platform. When we use that key in combination with other that needs to be pressed at the same time, we use `+` and the other key, so `Ctrl + s` represent the simultaneos pressing of the keys `Ctrl` and `s` at the same time. Keyboard shorcuts that contain `Ctrl` on Windows and Gnu/Linux, can be replaced by `Cmd` on Mac and to ease reading we don't repeat each shorcut on each platform. Sometimes we will put the keyboard shortcut in parenthesis, just after the action it referst to, like in "Open the spotter (`Shift + Enter`)".
- When we refer to menus and submenus in the Graphical User Interface (GUI), we will use `>` as an indicator of the menus hirarchy. For example, writing `Update > Grafoscopio`, means to choose the `Update` menu and then the `Grafoscopio` submenu in it.
- The PDF and HTML versions of this document include clickable links and words, that are shown in blue, for example the following words are a clickable link to the Grafoscopio web page.

1.2 Document and software versions

As convention, this manual has the same version of the software it documents. So the version number you see on bottom left side of each page, corresponds also to the Grafoscopio version.

Because we follow a [rolling-release][] model for Grafoscopio, it is possible that the software and the documentation get out of sync. Use the `Update`

menu from the docking bar to get the latest software and documentation, as will be explained later.

Grafoscopio is packaged with other companion software, that is installed automatically with it. This is the info for that packages and theri versions

1.3 On commons, copyright and copyfarleft

Grafoscopio is covered with the same MIT license as Pharo. This document is covered by the P2P license. Both are pretty liberal licenses that grant you a pletora of rights but I think that documentation and software do not need to have the same license, even in the case of Grafoscopio, where *interactive documentation is closer to software.*

I (Offray Luna) think that a deeper discusion on licences and the protection and expansion of knowledge as a commons is needed and this licenses difference reflect that. You can see a full copy of both licenses, MIT and P2P, included at the end of this

2 Grafoscopio for what and for whom?

Grafoscopio is moldable tool [@girba_scg:_2014] for literate computing [@perez&granger-2015], intertwining prose, code and agile data visualizations [@bergel-2015], in a tree-like interactive document metaphor, developed on the Pharo live coding and computing integrated environment. Because of the continuity and uniformity of the environment, Grafoscopio blurs the distinction between code, data, document, application and IDE and tries to blur the distinction between interactive documents authors and software developers [@luna-2017]. Grafoscopio has been developed in the context of a PhD research in a hackerspace of the Global South (HackBo in Bogotá, Colombia), instead of a academic institution of the Global North and, from this particular context, approaches concerns like reproducible research, simple and self contained *pocket infrastructures* (that work off-line/on-line from USB thumb drives and/or low resources machines [@luna2014]), citizen science and data activism [@luna-2014].

As such, Grafoscopio is intended to be used by learners and researchers in several fields: academia, journalism, activism, hackctivits and for anyone
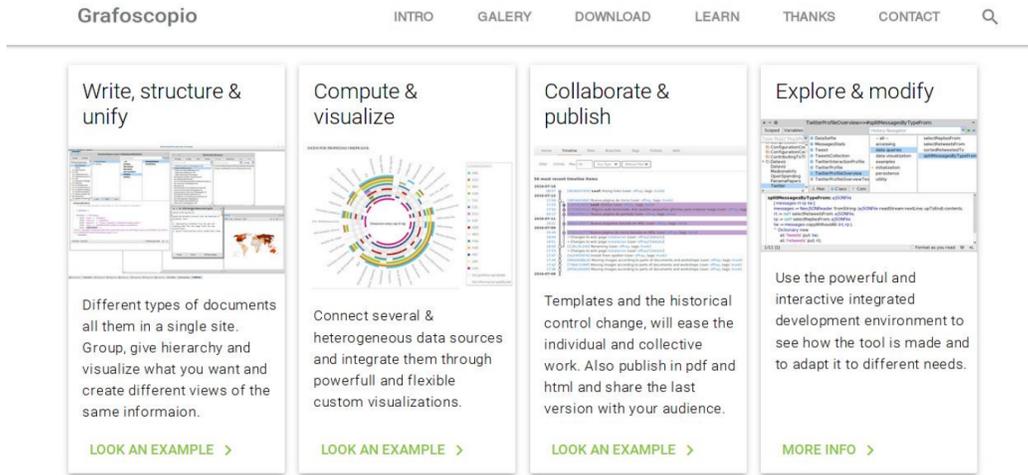
Figure 1: Detail for the Grafoscopio English web page

interested in open reproducible research and data storytelling backed by data and visualizations. This document assumes that you are such person. We will introduce the general features of Grafoscopio and point to several online resources to complete your panoramic view of the ecosystem and to deep your knowledge. Grafoscopio includes introductory resources to learn Pharo and data visualization related technologies, in the `Help > Tutorial (Spanish)`, and the web page (see figure 1) shows several examples of how to use them for specific projects: Panama Papers as reproducible research; open community innovation in access to medicine information; Twitter data selfies; specific domain visualizations for medicine information; open, garage and citizen science and research. *This manual was also wrote using Grafoscopio* and is also a sample of what you can do with this tool. We hope to inspire you to create and publish your own projects.

This document, by not try to be comprenhensive, is a first invitation to know the Grafoscopio environment and to deep your knowledge with the use of it and other related resources. You will see that some examples are pretty practical. No prior knowledge of programming is supposed to follow this manual.

IMPORTANT NOTE: Despite of being pretty usable, you will see that Grafoscopio is not totally finished, and this shows in a few spots of the Graph-

ical User Interface (GUI) that "point to the future", towards funtionality still to be implemented. It's an unusual approach, but I think that is important to convey some sense of possibility, and work to be done in the GUI, instead of a fully polished "product" or a GUI that hides what is not ready. This conviction comes from the workshops where we worked and evolved Grafoscopio, while the workshop was happening(!), thanks to the dynamic, moldable and continuous nature of the Pharo live coding environment. Blurring the distinction between interactive documents authors and software developers, means to put the whole environment at their dispossal, and to show the community that they can be part of this future possibilities, and that's why we take this unusual approach to GUI.

Where the GUI is more a remainder for the future, I will point that using the **TBD** remark (for To Be Done).

2.1 Place in the ecosystem

2.1.1 Similar tools

Grafoscopio is similar to other tools and has been inspired by many of them, while is trying to bring also new possibilities, by combining different ideas, diverging from others, puting "parallel" ideas into dialog and, hopefully, bringing new ones. Here we talk about the similarities and differences with other tools.

- Like jupyter, or zeppling, beaker or nteract, Grafoscopio provides interactive notebook functionality, but it is focused only on Pharo code right now, instead of being a "language neutral" notebook (but this could be a feature for the future). Grafoscopio is a multiplatform (Mac, Windows, Gnu/Linux) desktop application (like nteract, or electron beaker), instead of a web one (like jupyter, zepelling or beaker), providing a simple, extensible, powerful, self-contained and portable environment for interactive computing, (as said it can run from a USB thumb drive, modest computers and anything in between and beyond).
- Grafoscopio organices documents in a tree like metaphor that is interactive and programmable, like Org Mode, Leo Editor, TeXmacs or

[Pollen](#) and share with them the idea that the "document is the program"[1] (or a programable container of small chunks of programs and scripts). Also, the document author, can define custom tags that can be used to traverse the document tree and produce multiple particular views from a single document.

- Like [Jupyter Lab](#), Grafoscopio environment supports needs beyond the notebook. Grafoscopio achieves this by leveraging the advantange of the extensible Pharo computing environment and ecosystem, where it inhabits, with powerful tools for GUI, data processing and visualization, testing, code repositories, among others.

- Grafoscopio uses the [Roassal agile visualization engine](#), to build interactive visualizations and export them to the web. Roassal provides similar functionality to other visualization engines and toolkits like [d3.js](#), [RaphaelJS](#), [Processing](#) or [Flare](#), but, by being part of the Pharo live coding environment, it invites to a more explorative and dynamic building of visualizations in an agile way.

- At the moment, notebook sharing and collaboration and print (PDF) and web (HTML) publishing are supported, but in the future we hope to provide advanced interactive notebook publishing features in a distributed p2p fashion (see next section for the techologies that enable this).

2.1.2   Technologies behind

Grafoscopio tries to become a simple, understandable, moldable, versatile and flexible tool thanks to the power of [Pharo](#) environment and ecosystem and the combination with mature external and internal frameworks and tools. It uses:

- Internal

  - [GT Tools](#) and Spec for embeddable Moose playgrounds, GUI and interactive nodes.
  - [Roassal](#) for data visualization.

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[1]The idea of the "document is a program" is a paraphrasis of "the book is a program", stated in the Pollen documentation, which is a short phrase to express a powerful idea in several programs, like TeXmacs, Org Mode, Leo and, of course, Grafoscopio.

- – STON for a light data storage and a human friendly notebooks format.
  - – NeoJSON for interacting with structured hierarchical JSON data.
  - – Citezen: for reading and exporting bibliographies to the BibTeX format.
  - – Fuel: For medium data storage and objects serialization.
- External:

  - – Fossil SCM for collaboration and traceability of the documents history (including this very manual).
  - – Pandoc for exporting to printing (PDF) and web (HTML) formats.
  - – SQLite for storage and management of tabular data.

Despite of trying to provide a friendly, cohesive and empowering user experience (UX) by integrating default external minimalist and/or self-contained tools into the data exploration and document publishing workflow, other external tools could be integrated (Git, more data bases, including NoSQL, other exporters and light markup languages and so on).

3   Installation instructions

If you want to install grafoscopio on Pharo 5, there are two ways of doing: via the Pharo catalog or via running a script from the playground. Both suppose that you have already installed Pharo for your platform (Windows, Gnu/Linux or Mac) from its download page, and will be explained below, from the easiest one to the "not so easy".

Different install procedures suit different tastes and needs and bring alternatives, so, if one doesn't work for you or your need/taste, you can try others, or just leave it like that, if your chosen method worked.

3.1   Install from the pharo catalog

To install Grafoscopio, from Internet in Pharo 5, follow this steps:
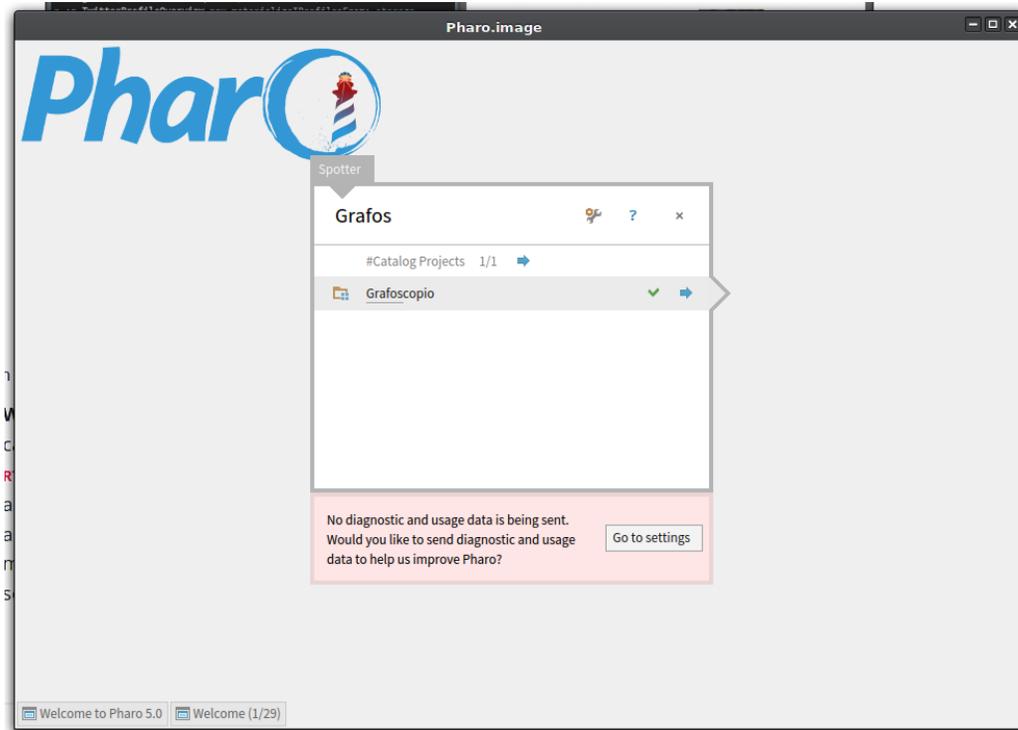
Figure 2: Install screen 1 | Finding Grafoscopio in the projects catalog

1. Open the spotter (`Shift + Enter`) and start to write the first letters of "Grafoscopio". The spoter will show that it is available in the projects Catalog as shown in the figure 2.

2. Click with the mouse or move with the keyboard to select the "Grafoscopio" package showed. A install question as the following will be shown (see figure). Select "Yes" to start the installation process.

3. While the installation is running, some progress bars with package names are going to be showed (see figure 4):

4. When the installation ends we will see two indicators (as shown in figure 5).
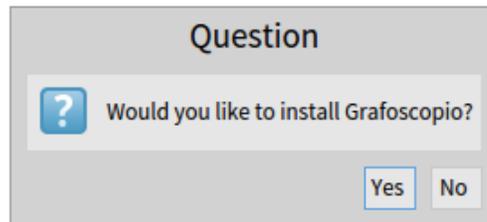
Figure 3: Install screen 2 | Install question
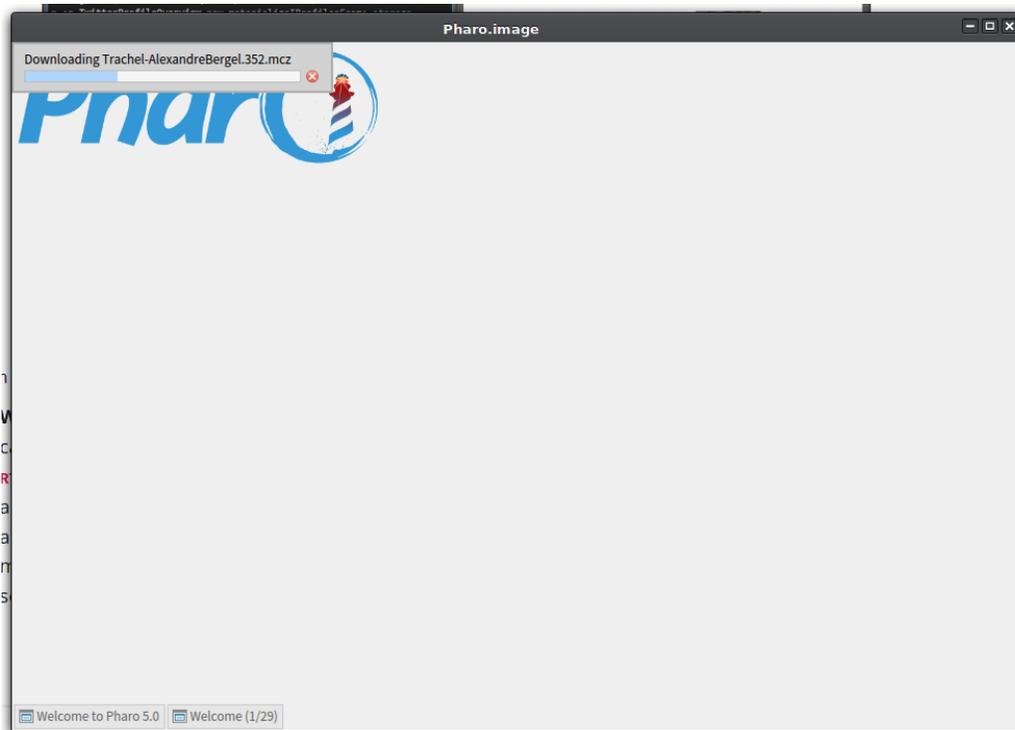
Figure 4: Install screen 3 | Installation progress bars
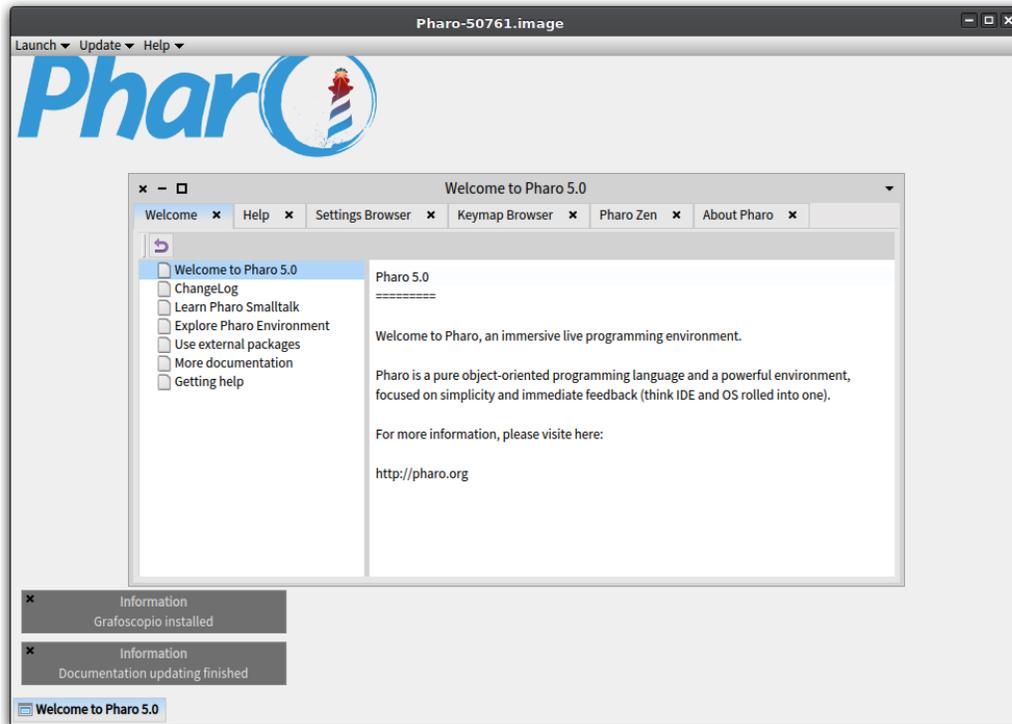
Figure 5: Install screen 4 | Installation ended

- Messages in the lower left corner telling that installation is complete and documentation is installed.
- A tool bar in the upper side of the Pharo window, called the docking bar.

5. Once we have Grafoscopio installed, we save modifications to our computing environment, by making click in any clean part of the GUI (not occupied by any window) to deploy the World Menu. There we choose save, to `Save` the system with the same name, or `Save as` to save it with a new one (see figure 6).
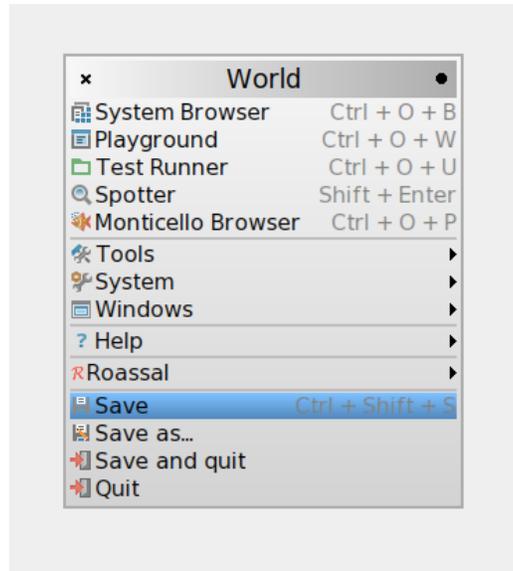
Figure 6: Install screen 5 | Saving changes via the World Menu

3.2 Install from a script

There are two ways of running scripts in the Pharo environment: one by importing them from Internet and the other by writing them manually.

If you want to run a Pharo script from its web address, open the spotter (`Shift + Enter`) and paste the address and then press `Enter` to open the interactive playground and finally press the `Do it and go` green play button or its shorcut (`Ctrl + Shift + g`).

For example, if you want to run the first part of the install script, open the spotter and paste this address http://ws.stfx.eu/BMWZPUY38BSF. You will see a screenshot similar to figure 7, showing the web address you have pasted and the first lines of the script below, marked in grey.

Press `Enter` or select with the mouse the grey area. You will see the interactive playground with the script loaded. We will see more details about the playground later. For the moment press the play button or the shorcut (`Ctrl + Shift + g`). You will see that the playground has been executed. An executed playground contains a new column with details of the object resulting from that execution, as shown in figure 8.
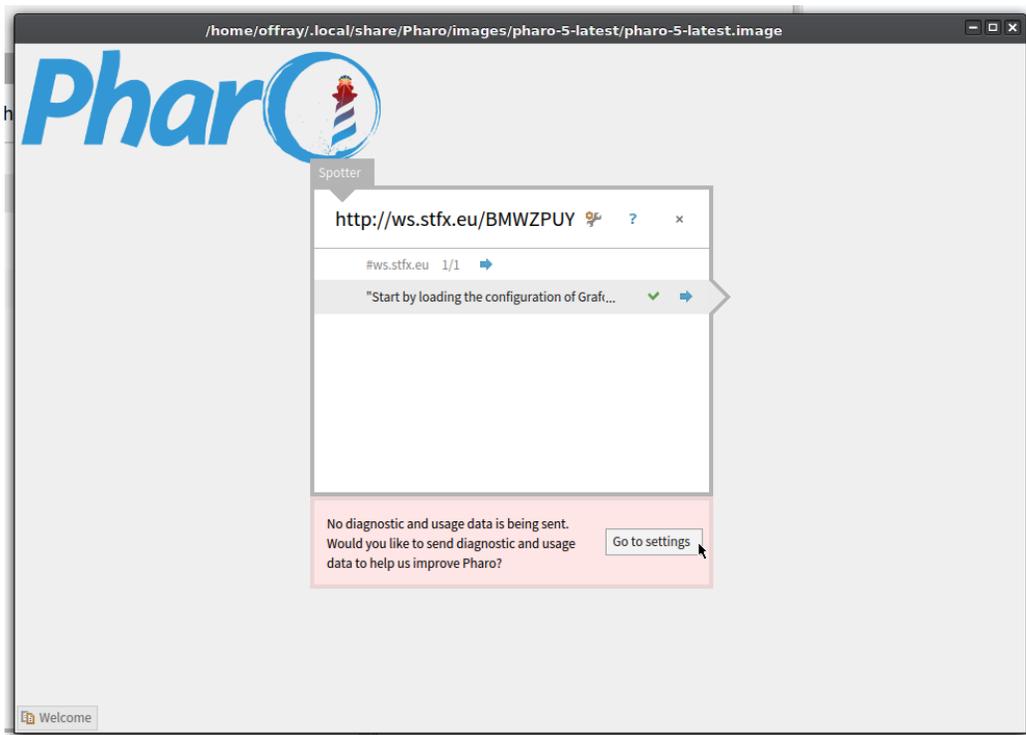
Figure 7: Loading the install configuration package
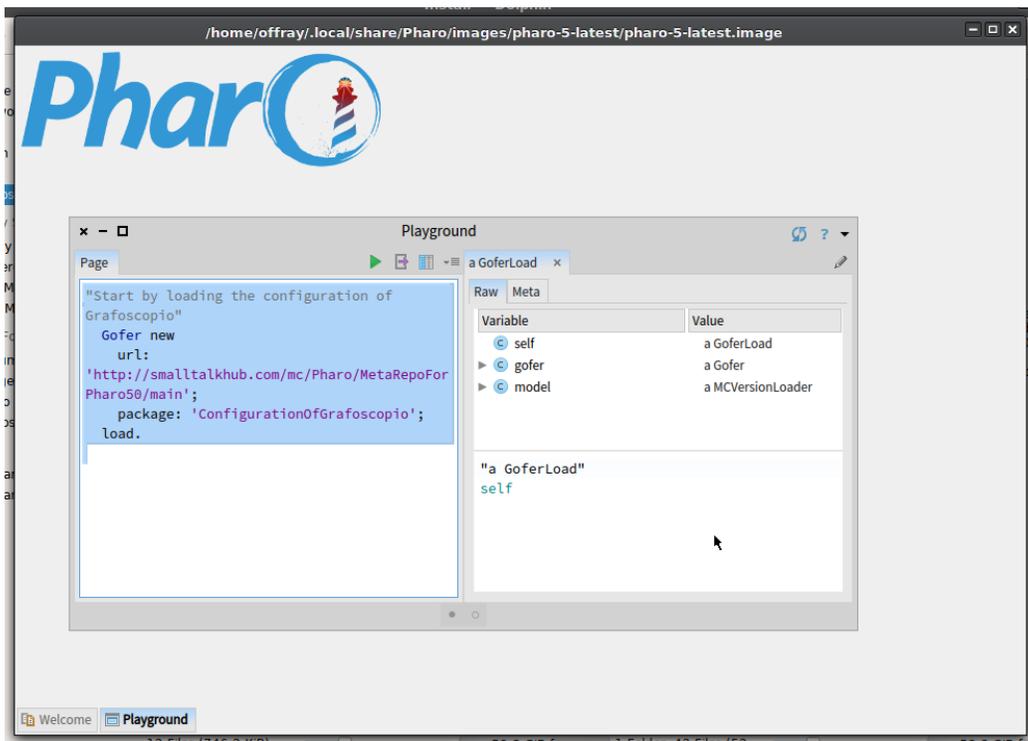
Figure 8: Executed playground

Figure 9: Loading Grafoscopio

Now repeat the procedure, opening the spoter, pasting this url http://ws.stfx.eu/CZ87ZZ2SXCEM and executing the second part of the installation script (showed in figure 9).

You will see the progress bars and the ending of the installation process, as described in the steps 4 to 5 of the previous section.

Is usual to run the previous two steps in a single playground, by executing parts of it. Here we are going to show you how to do it, with the same installation example we have done so far. Open a playground (`Ctrl` + `o` + `w`) and write this:

```
"Start by loading the configuration of Grafoscopio"
  Gofer new
   url: 'http://smalltalkhub.com/mc/Pharo/MetaRepoForPharo50/main';
    package: 'ConfigurationOfGrafoscopio';
  load.
```

```
"After that load Grafoscopio"
ConfigurationOfGrafoscopio load.
```

Now select with the mouse the script lines until the first load, as shown in figure

and the press the `Ctrl + g` combination. Only the selected part of the script will be executed (see figure).

Now select the second part of the script, as shown in figure

4   Using Grafoscopio

This section will show you how to use Grafoscopio from the GUI.

4.1   The spotter

One of the first elements of the Pharo GUI that is an excellent companion for Grafoscopio is the Spotter, provided by the GT Toolkit. It is a quick finder and laucher of system functionality, allowing you to launch scripts, find functionality, browse objects and classes, among others. To launch it press `Shift + Enter` in Pharo. You will see something like the figure 10:

You can learn more about the spotter in the Pharo MOOC [2].

4.2   The docking bar

The docking bar is a fixed point in the graphical interface for quick access to certain functionalities. Is divided in three menus that are explained below.

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[2]MOOC stands for Massive Online Open Courseware. The Pharo MOOC is excellent and a really good entry point for programmers wating to learn more about Pharo and Live Coding. It is also provides good complementary information if you come for other disciplines and endeavors and want to complement your reproducible research, modelling, data storytelling and visualization, with solid foundations of the Pharo environment.
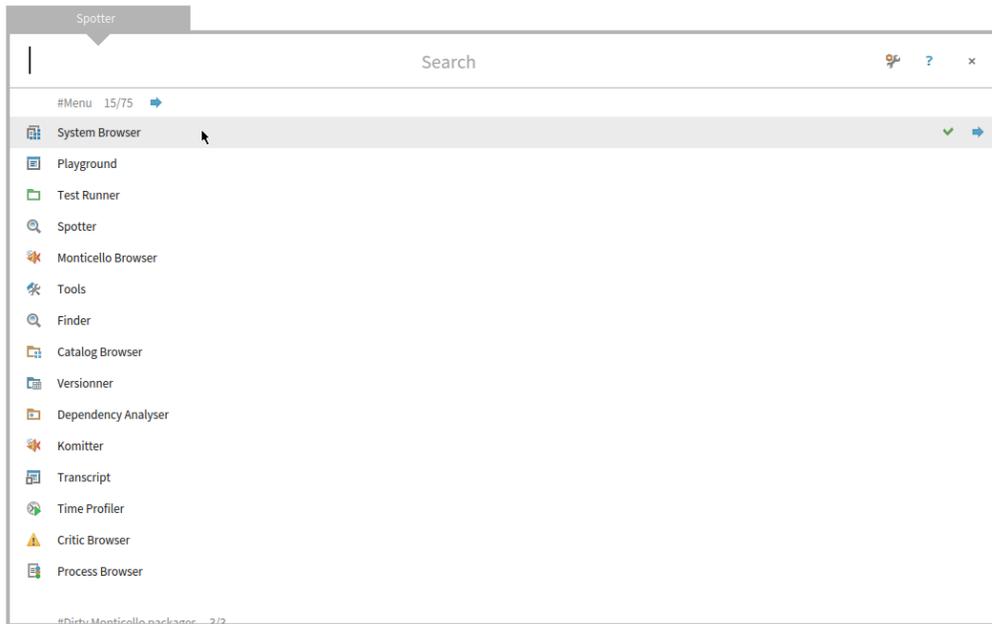
Figure 10: The spotter

4.2.1   Launch menu

This menu allows the creation of new notebooks and the opening of recent ones. Also it allows to launch playgrounds for writing code snippets and trascripts to see logs of the system.

Here is an screenshot of this menu options and a more detailed explanation of the options:

[][]

- "New notebook": Creates a new notebook.
- "Notebook from file…": opens a pre-existing notebook from a local file.
- "Notebook from internet…": opens a notebook from an URL and creates a local copy in the temporal folder.
- "Recent notebooks…": lists the notebooks that have been recently opened and/or saved.
- "Example notebooks…": (**TBD**) Lists a set of example notebooks (may be integrated in the`Help` menu).

- "Roassal visualizations Gallery…": Opens a visualization browser grouped by categories. Useful as starting point and inspirations for some projects.
- "Playground": Opens an interactive coding scripting environment, with single "pages". Playgrounds are also embedable inside Grafoscopio notebooks.
- "Transcript:" opens an output window to see log of events or see print messages.

4.2.2 Update menu

This menu updates functionality, documentation and settings for Grafoscopio. Grafoscopio has a [rolling release][rolling-release] model, similar to the Arch Gnu/Linux distribution and its derivates, so continuous updates in functionality and documentation, come after the version packaged with the default installation. The updates frequency increases with our Data Week hackathon-workshop, seminars, and other community events, so is good to go the update menu regularly.

This are the options in the Update menu:

- "Grafoscopio": Updates Grafoscopio to the latest development version from the repository.
- "Documentation": Updates companion documentation, that comes as native notebooks or in exported formats (PDF now and HTML in the future).
- "Dataviz Package": Updates the Dataviz companion package, which contains Domain Specific Languages and Visualizations that are introduced as Grafoscopio notebooks. A companion notebook about this package is available on the Help menu, for more detailed information.
- "Notebooks places": Updates some globally shared references for notebooks, so they can be adapted to personal preferences. This is useful for workshops, so participants can still store some notebooks in their preferred locations, while sharing relative routes. Examples of this functionality can be found in the Dataviz package notebooks documentation.
- "All the system": Updates all of the above, except for the "Notebooks places", without going for any individual menu.

4.2.3   Help menu

The Help menu contains mostly references to interactive notebooks that teach or exemplify how to use Grafoscopio or the core technologies behind (Pharo tutorial, Roassal, STON, etc). They are installed with Grafoscopio in native format and some are in PDF.

We have followed a local first approach for the Grafoscopio development, which means that most of the documentation is writen for the local context first and in Spanish. The Grafoscopio Manual is the first English "formal" document (besides blog post and constant communication with the international Pharo communities). Because the GUI is in English now (it was in Spanish at the begining), we indicate when a Help document is in Spanish. In the future we would like to have multilingual documentation, with a bigger team and community to work on this issues. And of course you're already invited to be part of it.

This are the options in the Help menu:

- "Tutorial (Spanish)": Opens a tutorial used for the Data Week hackathon/workshop, that advances in increasding difficulty, covering the Pharo introductory tutorial (Prof. Steph), some simple scripts, reading of structured data (in JSON), building of a first package (Cinemania), HTML templating and programatic generation (via Mustache) and basic web publishing (via Teapot). For a detailed view of the contents, you're welcomed to explore the tutorial by yourself! :-).
- "Manual": Opens this manual.
- "Manual (PDF)": Opens this manual, exported as PDF.
- "About Grafoscopio": Opens the "About" window.

4.2.4   Creating a new notebook

Once you have Grafoscopio installed, you will see a docking bar in the at the top of your Pharo environment. To create a new notebook you have several options:

- Choose `Launch > New notebook`, from the docking bar.

- Open a Playground (`Ctrl + o + w`) and write `GrafoscopioNotebook new openDefault.`

You will see a window like the shown here:

[][]

Next section will explain the functionality of the GUI showed on this window.

4.3 The notebook GUI

The notebook GUI is composed of tree main parts, as showed below:

- The upper bar
- The document tree
- The node details

Each of these sections will be detailed below.

4.3.1 The top bar

The top bar groups funtionality to save, export and edit the document tree and associate it to related assets, that form projects.

This is the detailed information.

4.3.1.1 The notebook menu

Allows the creation new notebooks and their exportation to external formats.

These are the options of this menu:

- "Save": Saves the notebook to the filesystem. If no filename has been provided, asks for one.
- "Save as…": Saves the notebook to the filesyste under a new name.
- "Export as markdown": Exports the current notebook to [pandoc's markdown][markdown].

- Export as html" (**TBD**): Exports the current notebook to HTML format.
- "Export as pdf"

See the "Exporting" section for details about exporting and the pandoc prerrequisites to make it work.

4.3.1.2   The project menu (TBD)

A project is a Grafoscopio notebook with the related files to produce particular outputs from it, including data files, HTML templates, other notebooks. A project tracks the historical changes on such files, allows collaboration between collective authors, exploring or unifying work variations (what is called branching and merging) and let the profreaders or audience made suggestions (via ticketing). Projects can be published on the web, providing reproducibility and increasing transparency.

Project functionality is provided in Grafoscopio thanks to the Fossil SCM (SCM stands for Software Configuration Manager and sometimes is called Distributed Control Version System or DVCS), a simple and self-contained software for asynchronous collaboration with a pretty small footprint, available for major platforms. Fossil is similar to Git or GitHub, but it is simpler that the former and doesn't hides functionality under closed source code software, like the later.

Despite of not being integrated yet, several projects have been done using the Grafoscopio + Fossil combination. For example, Grafoscopio uses Fossil as backend for its documentation and reporing issues.

4.3.1.3   The toolbar

The toolbar provides a series of icons to access frequently used functionality, organized by groups. In the future this functionality will be accessible also via keyboard shorcuts.

Here is a more detailed explanation of the icons functinoality in the toolbar.

4.3.1.3.1   Notebook saving and node cut, copy & paste

- [][./Images/icon-save.png]: Saves the current notebook.
- [][./Images/icon-cut.png]: Cuts the current node of the document tree.
- [][./Images/icon-copy.png]: Copies the current node of the document tree to the clipboard.
- [][./Images/icon-paste.png]: Pastes the current node of the document tree from the clipboard.
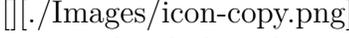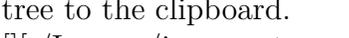
4.3.1.3.2   Node addition, deletion and movement

- [][./Images/icon-add.png]: Adds a new node to the tree after the currently selected one.
- [][./Images/icon-delete.png]: Removes the currently selected node.
- [][./Images/icon-up.png]: Moves the currently selected node one place upward, unless is the first node.
- [][./Images/icon-down.png]: Moves the currently selected node one place downward, unless is the last node.
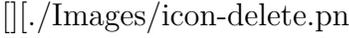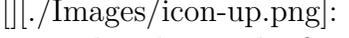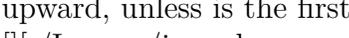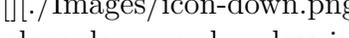- [][./Images/icon-up.png]: Promotes the currently selected node one place, to the same level of its parent.
- [][./Images/icon-up.png]: Demotes the currently selected node one place, making it child of the previous slibing.

4.3.1.3.3   Switching node body, visiting links and adding tags

There are two kinds of nodes in Grafoscopio now: text nodes and code nodes. This could change in the future, providing special nodes as particular handers and viewers of particular content (images, audio, video, and so on). But with the simple combination of this two kinds of nodes, complete and complex interactive documents can be created already, and complemented with the dynamic and inmersive Pharo ecosystem. Text nodes are writen in pandoc's markdown, with support to embedding images, bibliographic references and all the features provided by this markup language. Code nodes are interactive playgrounds of Pharo code, allowing to dive into different objects, and integrated with the Roassal agile visualization toolkit.

Literate computing, weaves code and text, emphasizing narrative and storytelling supported by data. That's why default nodes are textual ones. The [][] icon switches a node from text to code and viceversa.

The arrow icon [][] visits a node link, opening it in the web browser, if it is not empty (see node details for more information about node links).

The add/remove tags icons [][] [][] will be used to define custom tags to mark nodes (**TBD**). Custom tags can be used to define node traversal paths to create different outputs from a single notebook.

4.3.2   The document tree

The document tree is the place where the whole document is shown and provides a uniform metaphor to organize the work. It is at the left of the Grafosocopio Notebook GUI. This part will introduce the document tree and some vocabulary to be used with it.

The tree metaphor provides sequence and hierarchy to the document and its parts and is composed by nodes. Nodes have tree kinds of possible basic relationships: parent, child and sibling, which are represented visually for the indentation level of the nodes. We'll use this visual metaphor to introduce this relationships. The nodes indented inmediately at the right of other are called the children of the node at the left, and, converserly, the node at the left is said to be the parent of the nodes at the right. Nodes at the same indentation level are siblings, sharing the same parent. If a node has children, it will show an arrow head at the left. if the arrow is pointing right, the node is collapsed meaning is not showing its children. If the arrow is pointing down, the node is expanded, meaning that is shown them. (see figure below).

Finally, If a node A is parent of a node B, which is parent of a node C, then A is said to be an ancestor of C and C is said to be a sucessor of A.

4.3.3   Node details

As we said, documents are composed by nodes organized in trees. The node has tree parts: header, body and links. We will explain the detailed composition of a node below.

4.3.3.1   Node header

The node header is a short text (one line) that summarizes the purpose or content of the node. The header is shown in two places, in the document tree

(for navigation) and at the top of the node details, as a text field, for edition. Once the node header has been edited a color mark will be shown near the upper right corner of the text field box. This is known as a dirty marker. To update the header in the document tree press Ctrl + s (in Windows or Linux) or Cmd + s (Mac).

4.3.3.2   Node body

The node body contains more extense information for the node and can take several lines of text or code. Node body is located inmediatly below the node header text input. Node body is saved automatically with each keystroke, and takes advantage of the build in persistance for all Pharo objects (called image persistance), but if you want to update the notebook contents to the file system you will need to save the notebook explicitely, by pressing the save button in the top bar or chosing the save option in the`Notebook menu `.

4.3.3.3   Node links

Node links store links to web references. Sometimes when you're making quick outlines, you need to organice external web references and have an easy way to visit them. That's the primary functionality for node links. If a node contains a valid link URL in the node links, you can visit them, by pressing the blue arrow icon [][], which will open the default web browser in such link. The node links behave in a similar way to headers and the modificacions are saved explicitly by pressing Ctrl + s (Gnu/Linux, Windows) or Cmd + s (Mac).

In the future node links will behave in smarter ways, storing, for example, the history of shared playgrounds for code nodes, paths to the file system to export subtrees of a document, so, web browsing is just the begining.

4.3.4   More on code nodes

Code nodes are at the core experience of the interactive documentation, exploratory computing, reproducible research and literate computing. Code nodes are full Pharo interactive playgrounds embedded inside the Grafoscopio nodebook, with full functionality, including interactive inspectors, to

dive into the objects and graphical capabilities, thanks to Roassal. We use extensively code nodes in our Data Week workshops, in conjunction with the integrated Monticello DVCS, to share code in agile fashion and prototype ideas quickly. Here is a more detailed view of how to use code nodes.

4.3.4.1   Executing

Once a node has been defined as code (by pressing the [][] button), you will see a playground page inside the node body, with custom buttons for its functionality, as seen below:

[][]

To execute a code node, make click on any part of the node body and press the "Ctrl + shift + g" keyboard combination or click the "play" button in the playground page (see image below).

[][]

To execute a part of the code node instead, put the cursor at the line you want to execute or select the line(s) with the mouse and press "Ctrl + g".

4.3.4.2   Sharing

To share a code node, click the "play" button in the playground page (see image below).

[][]

Once you accept to share your playround contents, a notification popup will be shown, telling the url of your published playground and will be automatically copied to the system's clipboard (see image below), so it can be easily pasted in mails and other messages.

Playground publications hosting services is generously provided by Sven Van Caekenberghe (also, he is the author of the superb STON format and NeoJSON importers, used in Grafoscopio and the Dataviz companion package).

4.3.4.3   Importing

The previous topic show you how to share code nodes from the notebook to the web. This one shows how to import them from the web to your

notebooks. For this, the only thing you need to do is to paste the web URL for published playground in the node header and press enter. The node will become a playground with the contents imported from the web.

We use this feature extensively for our workshops/hackathons and in fact was inspired by them. Usually we have a set of etherpads to write quick notes collaboratively in real time by the event participants and we put there the links of the shared playgrounds, to be imported in Grafoscopio notebooks.

In the future the node links could show the history of the shared playgrounds and its transformations.

4.3.4.4 Diving on them

Code nodes are fully functional playgrounds, as we have said. So you can use the full functionality of them to dive into the objects. By executing the plauyground, you not only see the results, but also a customized inspector (provided by the GT-Tools) that allows to see the attributes of the object or query them.

Several customized tabs are shown according to the execution in the playground and can be extended and adapted further.

Some of the most used tabs are:

- "Raw": Shows the attributes of the object resulting from the playgrounds execution. Those attributes are also objects, so you can dive into them. Once you have selected an object, a faceted browsing will start opening a new set of tabs zooming into this particular object. The lower panel of the raw view, can be used to send messages to the main object, or the objects that compose it.
- "Meta": Shows the objects hierarchy starting with the one resulting from the playgrounds execution and ascending in the containing classes. Is pretty useful to have a quick overview of which is the vocabulary of the object, wich messages can be send and how they're organized (protocols) and implemented.

To know more about playgrounds and how they can be used and extended visit the GT-Tools page.

4.3.5 Extending the markup: %keywords

4.3.6 Exporting: markdown, LaTeX and pdf

Grafoscopio provides exportation capabilies to [pandoc's markdown][markdown] and from there, can be used with pandoc, create beautiful documents for the printing and the web, with templates and customized control over a lot of variables. In fact, the PDF version of this document was created in this way, from a single Grafoscopio notebook.

For the moment, Grafoscopio's main author is focused on PDF output, using [LaTeX](latex) as an intermediate format, because PDF is still the king format for research and he is finishing writing his dissertation using LaTeX to create a final PDF document, so the exported markdown is "LaTeX flavored". In the future, HTML will be supported also and more fine grained markdown export will be available.

To export a document, choose the appropiate option from the [Notebook menu][notebook-menu]. Exporting to markdown will save the document in the same location as the current one, but with`.markdown` extension and exporting as PDF will run the proper pandoc command on this document for such conversion (provided that pandoc is installed on your system at the usual location, if is not, it will send you an error message). If you want to export a document with a different name, you wil need first to save the native document with such new name.

5 API documentation

Because Grafoscopio inhabits a full live coding environment, it follows the custom of making the API documentation available inside a dynamic environment, instead in some static web page. To open the Grafoscopio package inside the system browser, and see the messages organized by protocols execute:

```
"Browser the notebook API"
GrafoscopioNotebook browse.
```

```
"Browse the document tree API"
GrafoscopioNode browse.
```

6   Tests

The core functionality of Grafoscopio is tested. If you want to see and run the tests, just open the tests package by executing

```
GrafoscopioNodeTest browse
```

7   Examples

There is a dedicated complementary package, called `Dataviz`, with examples, that was build with educative purposes, for a recurrent local workshop called the Data Week, where we invite a diverse community in gender, professions, educational and life backgrounds. Also we have a Spanish introductory tutorial, that is directed towards beginers.

To see such examples please load the Dataviz introductory documentation by executing the code

```
"This opens the Spanish tutorial"
GrafoscopioNotebook new openTutorial

GrafoscopioDocumentation openDataVizIntro
```

8   Community Guidelines

8.1   Seek support

Grafoscopio has a small and new born community. You can reach it by following the contact links in the Grafoscopio page in Spanish or in English.

Also you can discuss issues related with Grafoscopio in the Pharo users community mailing list . We follow such list and try to be active participants there and bridge the local Spanish community with the international one.

8.2   Report issues or problems with the software

To report issues of problems please visit our ticket section Fossil repository. Before creating a new ticket, please be sure to visit the current tickets, to see if your issue/problem has been not reported before.

8.3   Contribute to the software

As we said, Grafoscopio want to help in blurring the distinction between software developer and interactive document author, si we're pretty open to several ways of contributions: from simple bug reports, as explained above, to the creation of interactive documentation, domain specific languages (DSL) and visualizations, or software functionality.

Contributions usually take part on our recurrent Data Week hackathon/workshop and there you will learn how to use and adapt the software, starting by the basics, creating DSL and crafting visualizations and integrating them into interactive notebooks. You will also learn how to use Fossil and how to commit to our shared repositories. We're creating a tutorial (in Spanish) with all these themes covered, as memories for us and others to remember and learn from.

If you don't have the chance to assist to one of our Data Weeks or use the resulting notebooks, you can also ask for permisions in the respository using any of the contact ways, listed above. We are a small, new born and friendly community with low traffic mail communication and can discuss about contributions on an individual case by case approach, so your words, bugfix and suggestions will be listened and taking into account and integrated when it makes sense.

Welcome again to our community :-).

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