

Using NIR tools for the interfaces to the help and archive systems at the TNG telescope

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Abstract:

Astronomers using the TNG telescope may be confronted during their observing runs with the need to access information, help files, or the archive system. In order to allow observers to efficiently access the desired information and data using an interface they are already familiar to, HTML is being used and will be used in the future. The access to the facilities at the telescope will be initially limited to observers and to the technical staff; however, the use of de facto standards such as HTML and its browsers implies the possibility of allowing wider, although controlled, access.

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Introduction

The TNG (Telescopio Nazionale Galileo), built as a joint effort of the Italian astronomical community under the coordination of the Observatory of Padua, is a 3.5 meter telescope which will be operating at La Palma at the end of 1996 [5]. While optically and mechanically TNG can be considered as basically derived from ESO's NTT, its design from the instruments and control point of view is new and original. The mode of operation for TNG [21,22] will be based on an end-to-end model, and on assisted observing, with the possibility of flexible scheduling.

The instrumentation plan [8] currently includes an optical imager (OIG), an infrared imager and spectrograph (GIRIS), a low-resolution spectrograph (LRS), a high dispersion spectrograph (SARG). An adaptive optics system will be available; furthermore, a seeing monitor (DIMM) and a meteo station are currently being implemented.

One of TNG's most advanced features is the telescope and instruments control environment, which is tightly linked to the data handling and archiving mechanism. All instruments and sources of auxiliary information are managed by two software environments: GATE (GALileo Telescope Environment) at a lower (VME) level, and WSS (Workstation Software System [1]) at a higher level. This scheme allows all data to follow a predefined path, where information is handled and stored homogeneously, and the integrity and completeness of data are preserved. At a different level, a user interface based on X-Windows (TUI [11]) allows the observer to control telescope and instruments from a standard Unix workstation.

The information system a user will want to access while observing at the TNG will be composite: the above-mentioned user interface must allow access not only to the control system of telescope and instruments, but also to all the information needed to guide the user through a correct observing session. This means an efficient help system, but also access to archived data, namely technical information, data on trend analysis, seeing and meteo data, calibration frames for specific instrument modes and/or telescope status, *etc.* This information needs to be provided *at* the telescope; furthermore, access to external sources (*e.g.* astronomical catalogues, data centres, the user's own institute) may be necessary. A browsing mechanism familiar to the user, and possibly homogeneous in accessing both internal and external information, is highly desirable.

In this paper, the implementation of an information retrieval mechanism at the TNG is described, with particular reference to the help system and to the archives at the TNG.

Choice of the tools

While the user interface to control telescope and instruments has efficiency, robustness and fault tolerance as its main goals, the mechanism for browsing through internal and external information, as mentioned above, should be familiar to the user, and uniform through applications.

Therefore, while for the telescope user interface an *ad-hoc* development over X-Windows has been carried out, an hypertext approach was chosen to access information and data at the telescope. In order to increase users' efficiency, HTML is being currently used and is planned to be used for future applications, since HTML-based browsers, such as Mosaic or Netscape, are commonly used for NIR applications and are already familiar to users.

It is to be noted that access to the facilities at the telescope will be limited to observers and to the technical staff. This is justified by the need of refusing access to external users during telescope and instruments operation; on the other hand, external users may be possibly allowed to connect during the day, when no touchy operations will be performed. The use of *de facto* standards such as HTML implies the possibility of allowing a wider, although controlled, access. Conversely, users at the telescope can use the same interface to access both external and internal resources.

The help system

The help system for the TNG telescope and instruments control system is embedded in the User Interface of the WSS, whose preliminary structure has been defined in [11]. Additional documents on the TNG WSS [2,3,4] are available for reference.

Back in 1992, a hypertext-based context-sensitive help system [9] (version 1.0) has been built. The help files were plain ASCII files where special characters (backslashes and double dots) defined the hypertext links: the links could be represented as branches of an information tree, which could be navigated in both directions. Pressing the `HELP` button on a window of the TNG TUI, a help window would pop on the screen. The help window was formed by three areas: the menu bar, the help text and the sub-topic list. The menu bar contained two buttons needed to navigate backwards in the help tree: the Index button took the user to the first screen of the help file (the main topic), the Back button took the user one level back in the help tree. The success of the HTML protocol since 1993 made this implementation of the TNG help system obsolete.

The current implementation [10] (version 2.0) of the help system for the TNG exploits a high level of integration between WSS (the software controlling the telescope and its instrumentation) and an HTML browser. Actually, the browser used for this purpose is NCSA Mosaic v2.4. This will certainly change in the near future while more capable and powerful browsers are made available. A method of communication between the TNG TUI and Netscape Corp's Netscape Navigator is being developed, and will be the method of choice in the next TUI release.

In the following the current method (TUI and NCSA Mosaic) is described. Clicking on the `HELP` button of any interactive panel will pop up Mosaic with the appropriate help page, since the WSS panels have a help button pointing to a specialized URL. This means that Mosaic can be also used to browse information stored wherever on the Internet (provided that this possibility is given to TNG observers); it will focus again on the TNG help system as soon as a `HELP` button is clicked again.

A representation of a workstation screen containing the telescope control window and a help window implemented with Mosaic is shown in Figure 1.

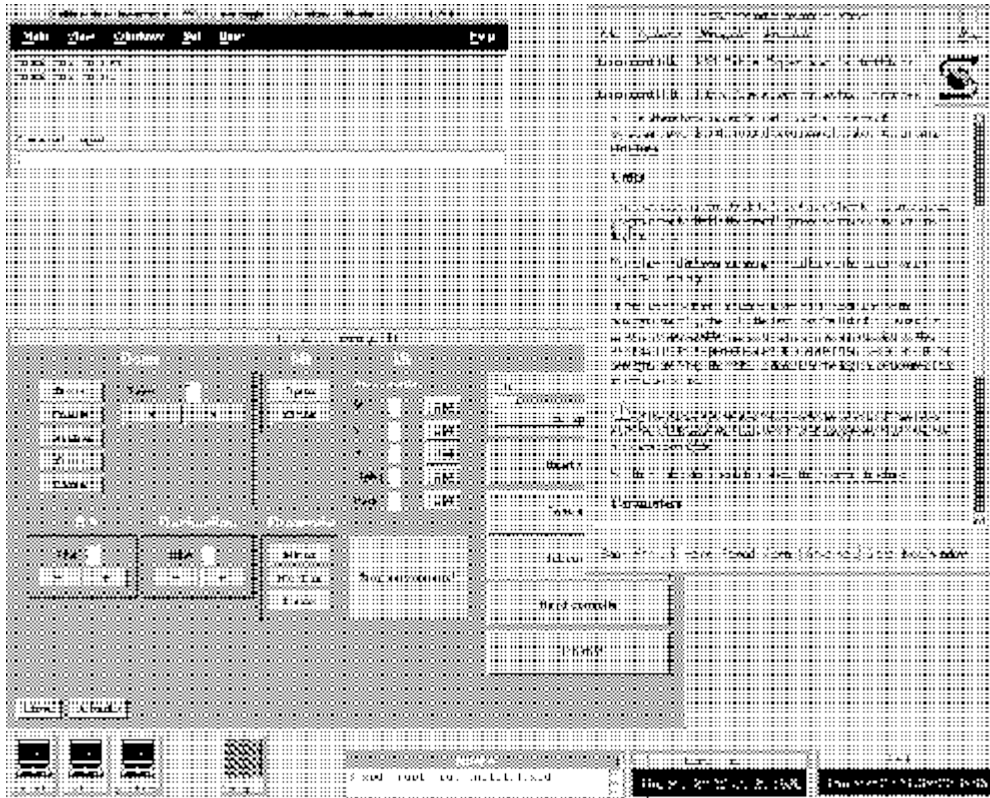


Figure 1: Representation of a workstation screen containing the main Galileo User Interface window, the telescope control window, and a help window implemented with Mosaic. The help window was obtained by clicking the `help` button on the main Galileo UIF window (upper left).

There is a high level of reciprocal control between HTML browser and WSS: the Mosaic client uses scripts to control the WSS, while the WSS controls Mosaic using the *remote control* mechanism of Mosaic [12]. This system allows Mosaic's signal handler to detect the "extra" signal `SIGUSR1`, to determine the process id of the issuing process, and to derive a config filename containing a directive (either a `goto` to jump in a document or a `newwin` to open a new window where to display a document) and the URL of the document to download and view.

E.g.:

`goto`

`http://www.oat.ts.astro.it/tng-www/docs/help.html`

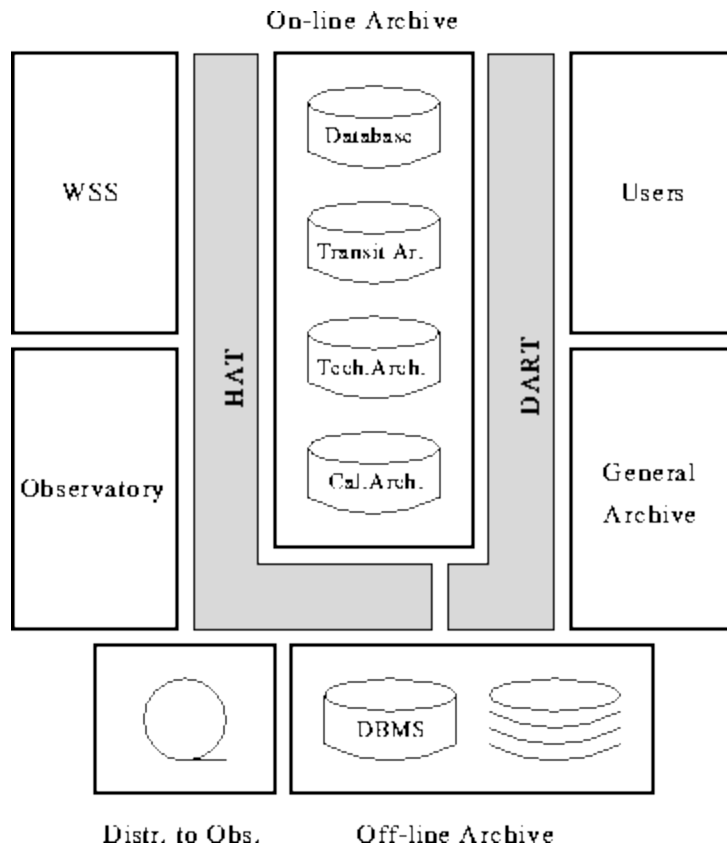


Figure 2: Scheme of the archive system at the TNG

The archives at the telescope

One of the interesting features of TNG is the fact that archiving has been envisaged as embedded in the end-to-end operations scheme of the Galileo observatory [21]. This allows the TNG archives to be usable both from a scientific and a technical point of view. Requirements for the TNG archives have been set in [7]; additional documents on the TNG archives [6,14] are available for reference.

A section of the TNG archives will be hosted at the telescope. This facility may be accessed to gather information on instrument response, trends, calibration procedures, or to retrieve "standard" calibration files. Access to the archives at the telescope will be restricted to observers and observatory staff, although there is no technical obstacle in allowing a wider access.

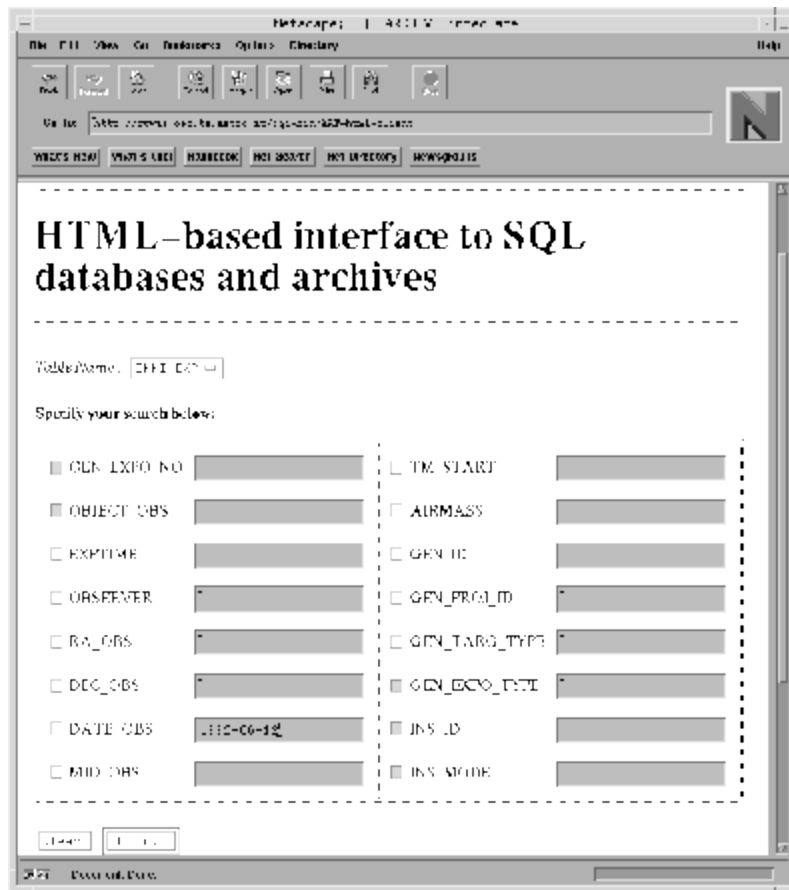


Figure 3: Querying the archive: constraints are specified in the fields of an HTML "form".

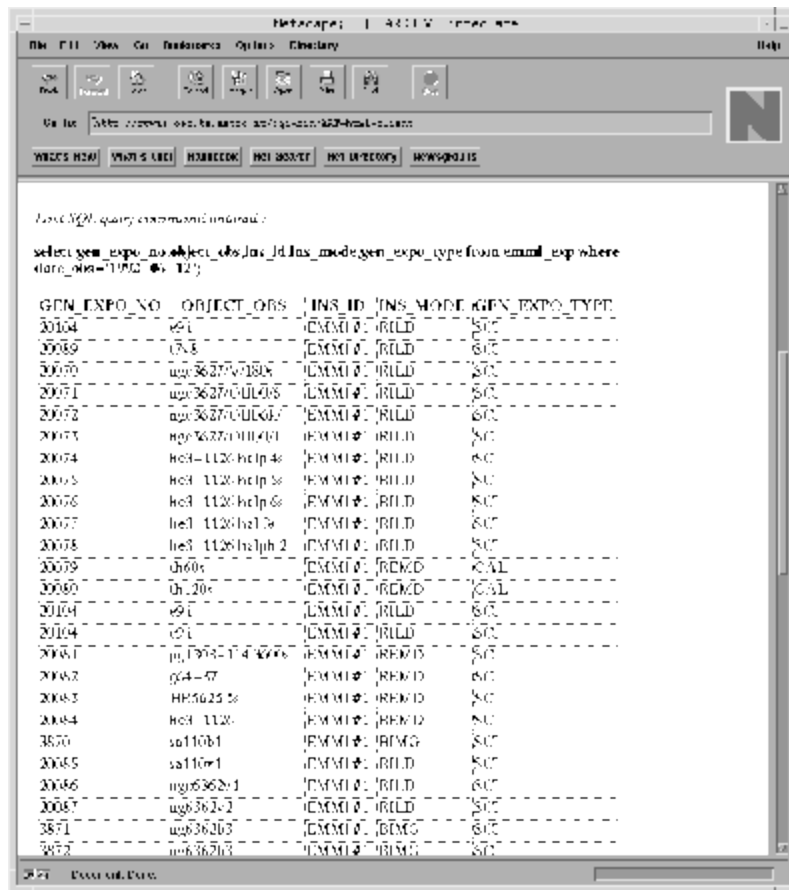


Figure 4: Retrieving information from the archive: data are displayed using the HTML tabular format.

The concept of building the TNG archive as a part of the data handling chain had already been formulated in 1992 [15,16]. The archive system at the telescope has now been designed [13] and is currently under development. The information on instruments will be contained in the Technical Archive, and the calibration files in the Calibration Archive. The "standard" calibration files stored in the Calibration Archive at the telescope can be used to perform a suboptimal reduction of the acquired files (*Quick-Reduction*) to evaluate the scientific quality of an exposure while taking the following one [17].

All archives at the telescope will be filled directly on the mountain by the Handling and Archiving Tool (HAT) and may be accessed by the DATA Retrieval Tool (DART). The rôles of the HAT and the DART are depicted in Figure 2.

The user interface to the archives at the TNG will be part of the DART, and will be based on HTML browsers. The mechanism is to use HTML forms to prepare alphanumeric strings following the SQL protocol; the strings are passed to the database management system (DBMS), which will handle the query, retrieving database information and displaying it on the window of the HTML browser used. Mechanisms have been envisaged to display graphically the results of a query as X-Y graphs, or to display 1-D or 2-D quick-look (compressed) data. Such concepts have already been successfully tested on prototype implementations [18,19].

Currently, the handling and archiving of TNG data are being simulated using NTT EMMI data [20]. The DART application allowing access to the simulated on-line archive is currently being developed: examples of query and retrieval of archived EMMI data are shown in Figures 3 and 4, respectively. Queries are implemented by filling fields on HTML "forms" with the constraints the query has to fulfill, while the results are displayed in tabular form. As an exercise, Figures 3 and 4 have been obtained fully exploiting the table specifications of the HTML 3.0 proposal version, currently supported by Netscape 1.1b3 and, with quite a few limitations, by Mosaic versions from 2.5 up.

Conclusions

Some years ago, the problem of providing efficient and easy-to-use user interfaces was one of the key issues in the development of any system. The explosion of hypertext systems to be used over the Internet has immensely simplified the approach to this problem. Due to its vast popularity, HTML is currently an obvious choice for the protocol on which to base a hypertext system.

This paper has shown that HTML tools can be used successfully to build applications not strictly related to NIR, such as access to local help, data and information at a ground-based telescope.

Acknowledgements

The TNG archives have been defined in a working group including Leopoldo Benacchio, Carlotta Bonoli, Sperello di Serego Alighieri, and FP.