

New Server Concept at the BKG Data Centre

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Abstract

The Federal Agency for Cartography and Geodesy decided in 2002 to develop and realize a new server concept for the data centre. The objective is to make the access to the data centre more comfortable for the users as well as for the administrator. It should be possible to get all information by usage of the http protocol. Also the administration of the data centre should be easily possible by the generation of helpful status overviews and the execution of predefined repair batches. For that purpose the LAMP (Linux operation system, Apache web server, MySQL data base and PHP script language) server concept will be used. The new server will not change the disk file structure and thus batch programs for ftp downloads may still be used. LAMP enables to show the current content of the database by the generation of dynamic web pages. A preliminary version of the new server has been installed at the end of 2003 and is currently running in parallel to the existing server. It will replace the current server as soon as the full functionality has been confirmed. In 2002 about 10 new GPS/GLONASS stations has been established in Germany by BKG and provide observations in a real-time data stream using the NTRIP protocol. These data streams are compiled to hourly files and copied to the data centre. High-rate data are currently not archived at the data centre, but corresponding procedures may be implemented if requested by a certain number of users.

Introduction

The Federal Agency for Cartography and Geodesy (BKG) operates the Regional IGS Data Centre (DC) for Europe. This data centre holds additionally data of the EUREF GPS Permanent Network (EPN), and the National German Reference Network (GREF), which demonstrates the multi-project structure of the DC. The current realization of the DC suffers from several drawbacks. Only 1 to 2 members of the staff could maintain the data centre because of the unclear type of implementation and this prevents an effective personal backup. After operating the DC for more than 10 years, too many exceptions contrary the general procedures have been accepted. The programs became consequently unclear and debugging is now difficult. Daily maintenance needs quick information about active processes and missing data, but those are sparsely available, and it takes too much time to detect any inconsistencies in the data transfer and errors of the running processes. The access to the DC needs also some improvements. The current structure is designed for usage of ftp in batch-mode. But today's users ask additionally for interactive search and download features. It becomes obvious, that a clear presentation of the DC on the web is mandatory. New components have to be added to the DC beside improvements of existing functionalities. BKG plans to participate in the GPS Seamless Archive Centre (GSAC) by acting as wholesaler. This requires installing the wholesaler software.

Considerations to New Server Concept

It was decided to develop and implement a new server concept instead of expanding the existing one. The following requirements to the new server had been noted:

- The access should be more comfortable for users and administrators,
- a quick orientation for users is desirable,

- a clear structure is helpful for maintenance,
- a better visibility of the current content of the data centre is desirable,
- an easy repair and fallback possibility is necessary, and
- the GSAC Wholesaler kid is based on perl modules and perl should be used more generally.

We decided in favour to use the LAMP server concept, which means to use the Linux operating system, the Apache web-server, the MySQL database, and the PHP script language. This “open source” system may be implemented on standard hardware, e.g., PC and RAID disk system. The extensive usage of the http protocol by DC users and administrators enables to easily access the DC from everywhere. We expect to enlarge the personal backup for maintenance because one could quick familiarize with the system. The usage of the MySQL relational database is well suited for all bookkeeping tasks and provides the input for dynamical web pages. The PHP script language completes the concept and could easily be used to generate web pages from data base requests.

There exist several restrictions for the new concept. The file system must remain unchanged and the access by anonymous ftp must be continuously possible during the implementation of the new server. We must furthermore account for the guidelines of various projects and services. BKG acts as Regional DC for IGS, DC for EUREF as well as German National DC. Each project holds its own guidelines and therefore we will continue to store the files in project specific directories.

General Structure

A detailed structure of the DC had been designed after the decision to use LAMP. There are now several groups of system programs:

- Watcher programs are looking for new incoming files,
- ftp-processes move the files from incoming into working directories,
- the GSAC daemon starts the required perl programs to fulfil the requirements of a GSAC wholesaler,
- the maintenance daemon cleans regularly the temporary directories, and
- the file processing is basically performed by a so-called RINEX daemon and a mirror program.

There was a special focus on the administration tasks during the planning phase. The following requirements for purpose of administration had been found:

- An alert management which includes an ‘error console’ will be established,
- enhanced automation will be implemented, and it will be possible to set up new process using http,
- the monitoring option will show and handle all processes,
- it will be simple to configure new task, e.g., to set up a mirror for downloading station logfiles, and
- meta data, which are useful for administration, will be stored in the database.

Demonstration

A variety of screen shots of the new server are explained in the following in order to demonstrate functionality and appearance. Figure 1 shows the always-visible navigation frame on the left site and an overview of available daily observation files for the listed stations of the selected EUREF project. It is a graphical representation of the very popular “Checkimport” program from the Astronomical Institute of the University of Berne. Different colours now indicate the delay of the data files. Each coloured box in

Figure 1 is clickable and a click shows the file details as given in Figure 2 for one selected file. A resubmission counter informs about the number of new submissions. The relevant station information as given in the logfiles is added to the database for each station. Figure 3 shows the corresponding station-edit menu. The history of receivers and antennas of the particular station is listed and may be manually edited if necessary. The interactive data download by usage of http is shown in Figure 4. The user could get a ZIP-archive of the selected files. Figure 5 shows the error console after zooming into one particular error message. Some actions are frequently necessary, e.g., “reprocess file”, and their start is predefined in a pull-down menu on top and bottom of the error console. Only the administrator could use the error console after authentication by password. A list of all active processes of the DC may be visualized as given in Figure 6. The status of each process is indicated by a colour symbol and allows a quick check of the overall “health” of the DC.

Data Streams and High Rate Data

We give here a short summary of BKG’s strategy of handling real-time data streams and high rate (1 Hz) observation files. The web page of the current data centre includes information about available real-time data streams, which are provided by BKG in the NTRIP protocol. Users could download the software, which is required to receive such data streams. A subset of the real-time data streams is accumulated to hourly observation files and sent to the DC as regularly files. High rate data are currently not archived at the DC. We could develop the corresponding programs, if it is requested by a certain numbers of users.

Conclusion

The motivations for the realization, the basic structure and the layout of the new server concept of the BKG DC have been presented. The demonstration, which is given in Figures 1 to 6 could give only a first impression of the new functionality, but it shows the modern and user friendly design. It contributes to a better visibility of the IGS products. It is expected to improve the DC maintenance by fast reaction time on operational errors. We will run both (the old and the new) servers parallel until the functionality and robustness of the new concept will be confirmed.

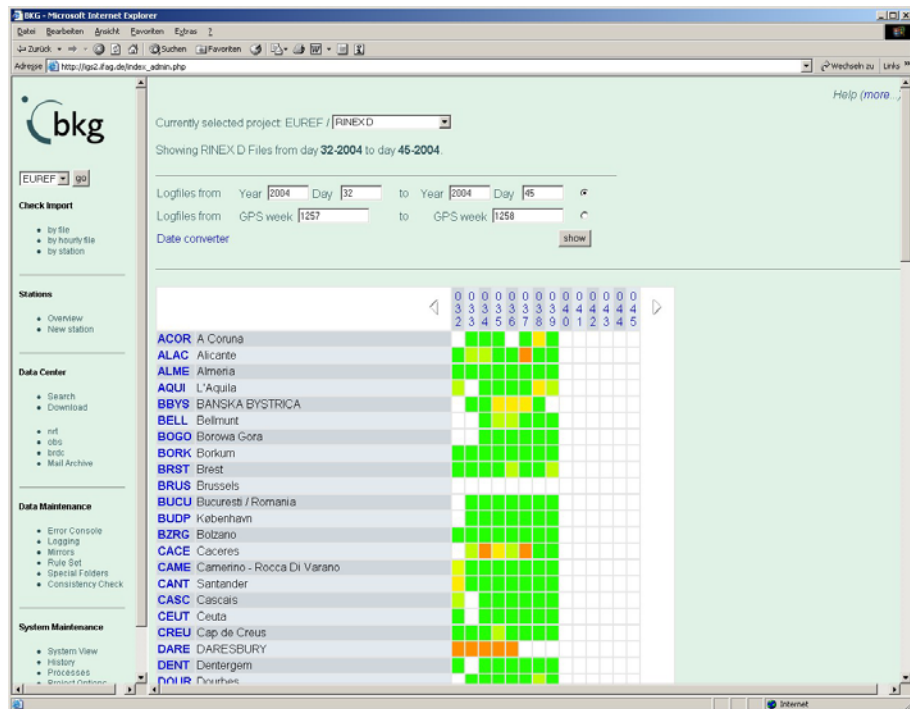


Figure 1: Data Holdings

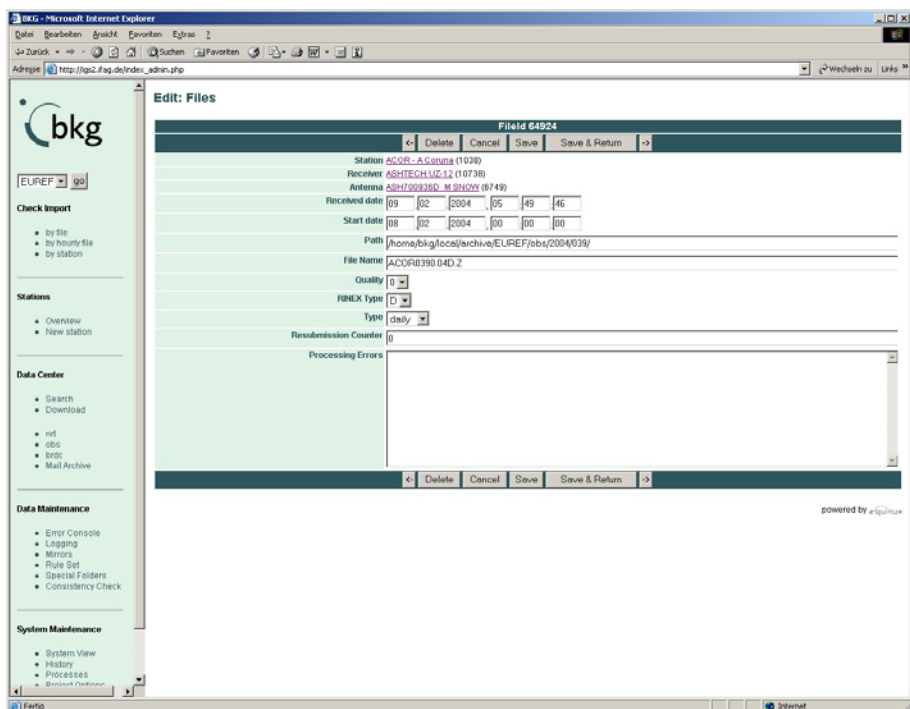


Figure 2: File Details

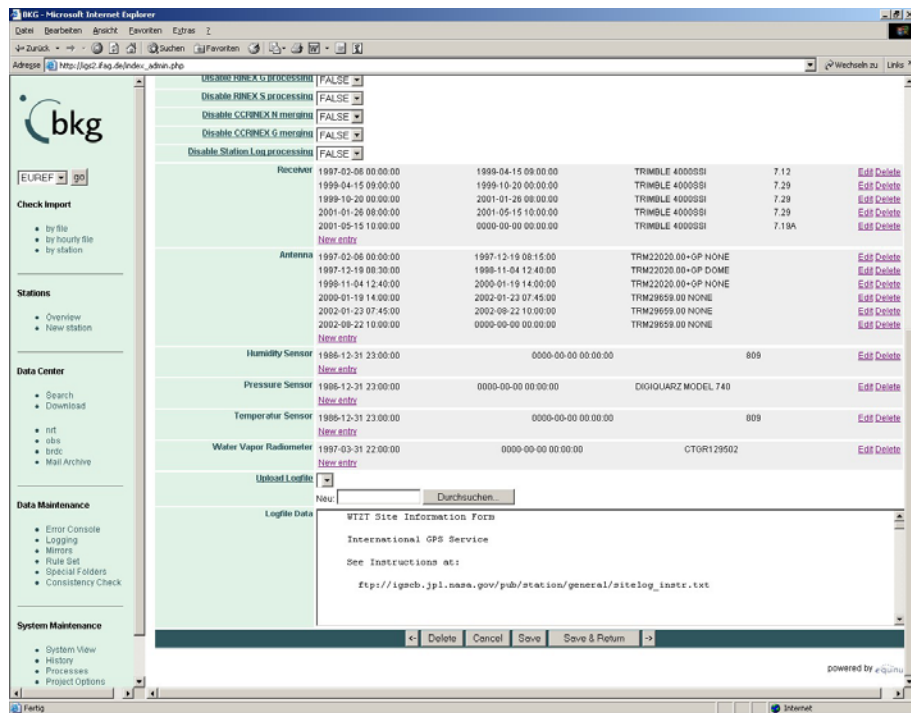


Figure 3: Station Edit Menu

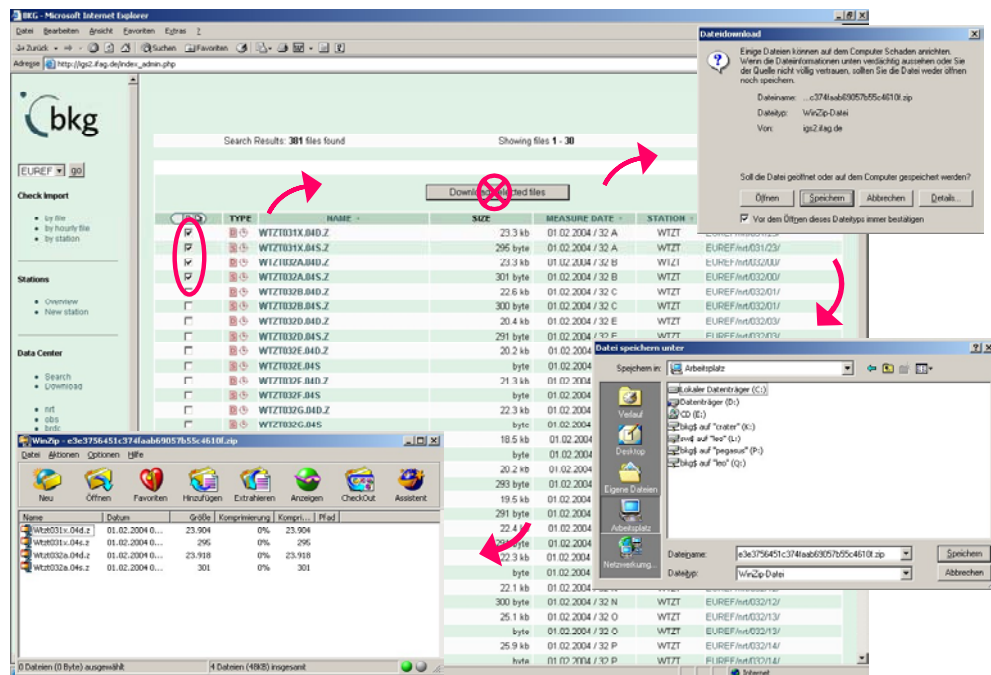


Figure 4: Interactive Data Download

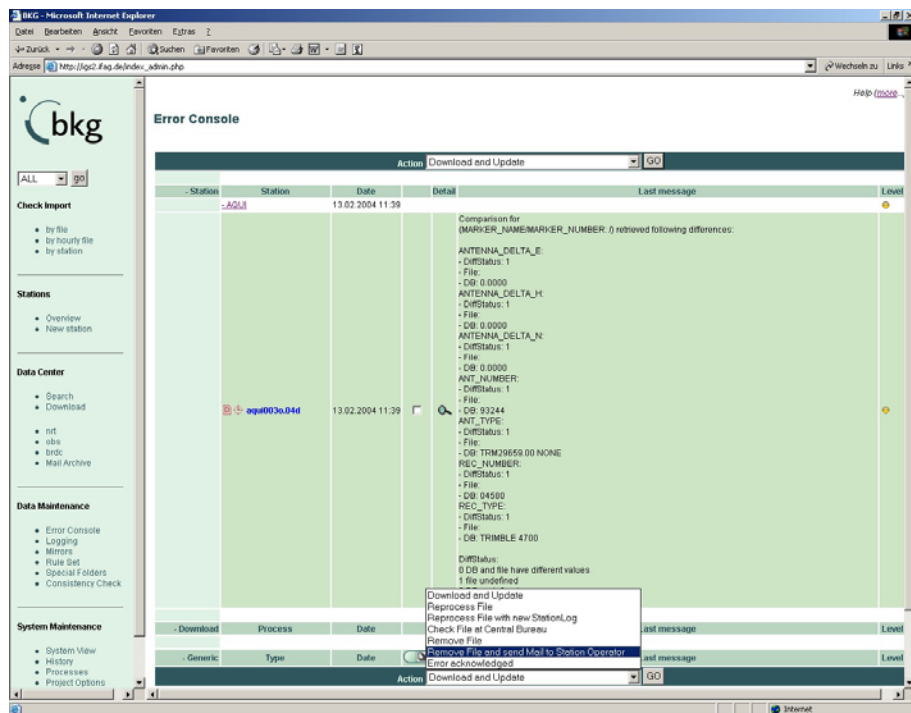


Figure 5: Error Console

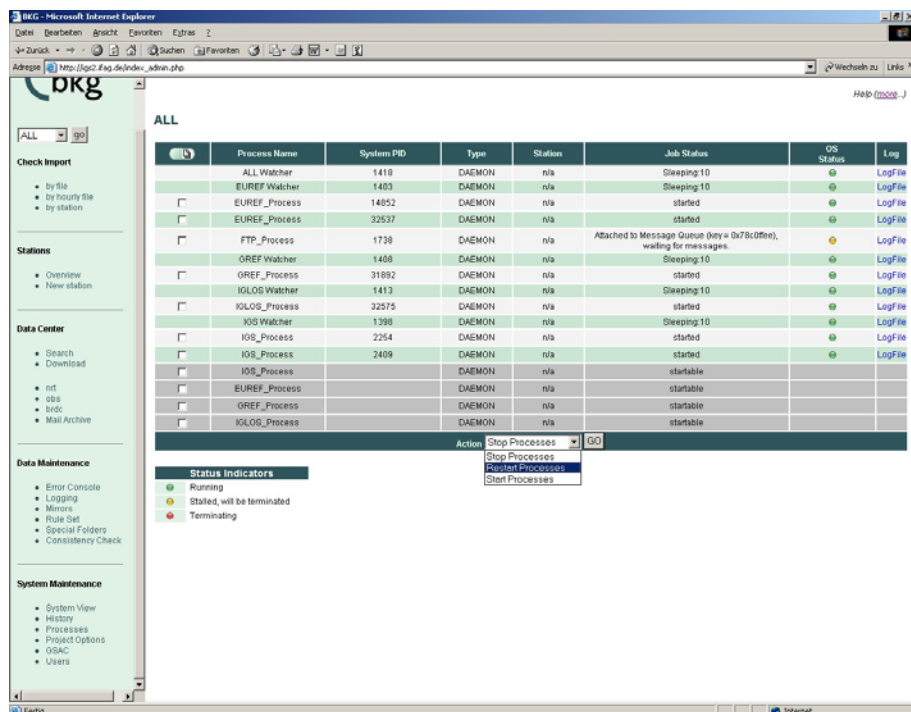


Figure 6: Process Overview