ACCELERATOR TROUBLE TICKET

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Abstract

The DAFNE Accelerator complex, a 1020 MeV center of mass lepton collided for Phi particle production, consists of: a linear accelerator, a damping ring, nearly 180m of transfer lines, two storage rings that intersect in two points, a test beam area providing e+/e- and photos (BTF) on demand, and three synchrotron light lines (DAFNE-L). The complexity of the machine and subsystem pushed us to develop a system for logging, archiving data, making statistics and history of the DAFNE accelerator and experimental user's faults, warnings, news and general setup information. The Accelerator Trouble Ticket is a web tool (PHP, MySQL and email based), which allows for complete handling and sharing of all accelerator information with the scientific, technical and service members staff; it also allows experimental users easy access via the World Wide Web. The architecture and implementation of the system, and these ease of exportation and configuration for any accelerator complex is presented, along with examples of products and results obtained form the first year operation at the DAFNE accelerator.

DATA STRUCTURE

The faults, warnings, and news are divided in subclasses of structure accelerator components, services and experiment and for each subclasses there are other sub-subclasses for specify the type of intervention. Data and configuration database is based on SQL (Structured Query Language) accessible true a MySQL server running on the LNF central cluster; Webmin software is used to generate tables and verify the database query.

Events considered are *faults*, *warnings*, *news* and *db*_debug (use to share and query debugging information between users and developers), divided in subclasses: services (vacuum, cooling, linac system, cryogenics, safety and radioprotection, feedback, etc), accelerator structure components and experiments. Any data entry is tagged by a specific *ID Ticket*, *opentime*, *closetime* and *Description*. Tables are indexed by this field for a fast search and database handling during fault recovery and statistics reporting. Information

GUI and database query to SQL database is written in PHP (PHP, Hipertext Preprocessor - scripting language especially suited for Web development and can be embedded into HTML). The graphic style is defined with CSS (Cascading Style Sheets).

Table 1: Services list, first classes filed.

LINAC
VACUUM
FLUIDS
POWER SUPPLY & MAGNETS
RF_SYSTEM
SAFETY SYSTEM
MAINS
CONTROL SYSTEM
CRYOGENICS
ALIGNMENTS
OPERATION
KLOE
FINUDA
DAFNE-L IR
DAFNE-L X
DAFNE-L X-X
SIDDHARTA
BTF
SIS
DIREZIONE
DAFNE
FEEDBACK & DIAG & TIMING
RADIO PROTECTION
DB_BUGS

History chart report of DAFNE machine activity are gathered by the Control System as well as luminosity, beam position, vacuum and experimental details. Bought ROOT libraries (from CERN program library) and LabView generate histograms and plots served through DAFNE web server displaying data history status or build the history on many days; the system was created with a CGI (Common Gateway Interface) programs under Apache Web Server. The PHP permit to build the query for MySQL database, the interaction with users interface, and also uniform the interface for all information; create the web page. The statistics are developed with JpGraph, a graphic library that allow to create a different graphs completely write in PHP based on GD Library.

The DAFNE Trouble Ticket is a web flexible tool based on some popular software, easily exportable to any other accelerator complex and OS independent.

WORKFLOW

The first function is the *authentication* that allows any users in the control room, operators or scientific members staff to access the Trouble Ticket system. Authentication is based on CASSiO (Cookie-based Authentication and Single-Sign-On) that is a web library developed at LNF-INFN. It allows web developer to easily implement authentication through multiple protocol (AFS, Kerberos5, LDAP, NIS, LocalDB), it also achieves Single Sign On among CASSiO-based web applications. CASSiO functions can be used in PHP, Perl and Phyton (SSO check only). Different access levels are permitted, unauthenticated users can only access to last 24 hour and monthly *Report*, while fault, warning and news handled is permitted with different authorization level.

The *show* function permits see the tickets submitted and statistics; the *open* function - faults, warnings, news, bugs – allows operators in the controls room to start a new entry as well as *updates*, *forwards* or *close* the ticket; only the supervisor of service can *close* permanently the ticket and submit the final comment on field *responsible acknowledge*; ticket colors permit to recognize the status of operations and the working around stored by the *update* function. The supervisor receive an email when the ticket is submitted. The body of email, the *opening comment*, contains the information recorded by the staff on duty. In the main time the information are stored in the SQL database.

The function *report* have two different kind of interactions, the first it's the plots of DAFNE machine activity the information are directly gated from dafne web server, this information are storage on AFS (Andrew File System, a distributed file system enabling users to share and access all of the files stored in a geographical network of computers as easily as they access the files stored on their local machines). The second is the report of operators working in the control room on shift. Operators can entry general comments on the behaviors of the accelerator during the shift independently from faults or warnings or trouble in the machine. The *upload* function permits the storage of files, like pictures, docs, cad draw, limited to 8MB, in order to store auxiliary information: scope waveform, machine layout, etc.

The *status* function show the accelerator complex operation during last two hours and all day long.

The *statistic* function show fault and warning submitted, represented in histogram plots divided by services and sub services component.

Unauthenticated users can also access to the calendar for DAFNE scheduled operations where day by day all the experimental user activities are planned.

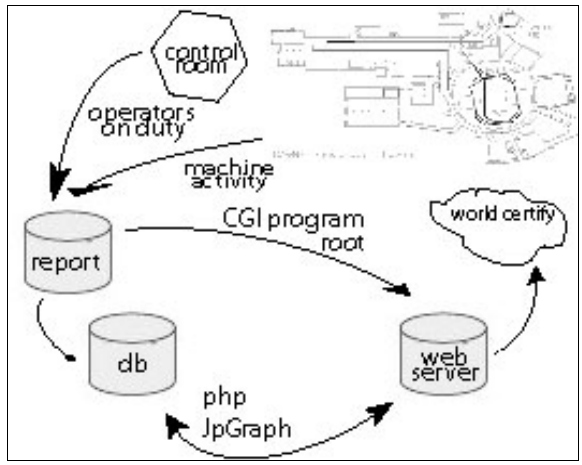

Figure 2: Layout of the Trouble Ticket system.

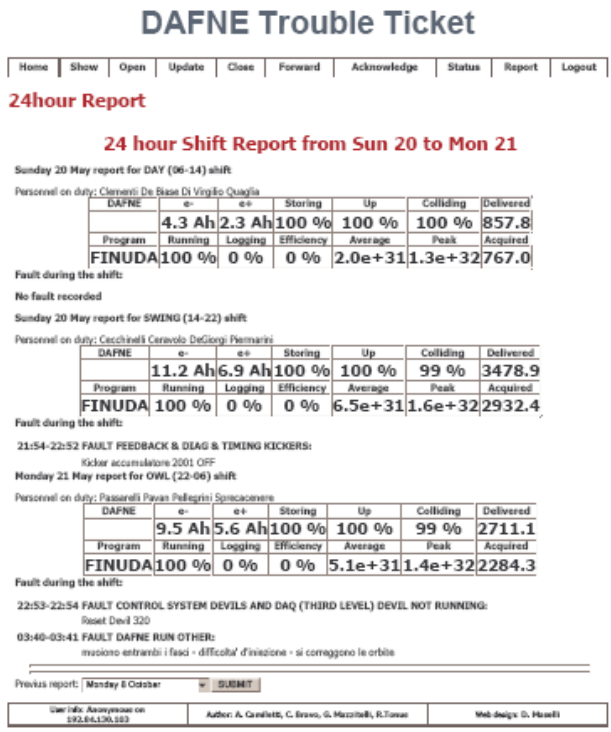

Figure 3: DAFNE Trouble Ticket fault daily report page. Those information are available to anyone.

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REFERENCES

[1] G.Di Pirro, G.Mazzitelli, I.Sfiligoi, A.Stecchi “A new low level processor for the DAFNE Control System” INFN-LNF Frascati, 2002.
[2] G.Mazzitelli et al., “The KLOE/DAFHNE Status Logging, Analysis and Database System” ICALEPCS 2001”.
[3] G.Di Pirro, G.Mazzitelli, C.Miliardi, F.Stella, A.Stecchi, F.Sannibale “The evolution and status of DAFNE Control System”, INFN-LNF, Frascati, 2000.
[4] Worldwide Headquarters, Sun Microsystems, Inc. 4150 Network Circle Santa Clara, CA 95054 USA (http://www.sun.com).
[5] PHP Group http://www.php.net/
[6] MySQL http://www.mysql.com/
[7] The Apache Software Foundation, 1901 Munsey Drive, Forest Hill, MD 21050-2747, U.S.A. http://www.apache.org/
[8] JpGraph, Vegagatan 32, 1tr, SE-172 34 Sundbyberg, SWEDEN, http://www.aditus.nu/jpgraph/
[9] ROOT, http://root.cern.ch/
[10] OpenAFS, http://www.openafs.org/
[11] LabVIEW, National Instruments Corporation, 1150 N Mopac ExpwyAustin, TX 78759-3504 http://www.ni.com/
[12] Webmin, http://www.webmin.com/