

§12. Unification Platform for Management System of Databases and Data Taggers

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A database for research purpose is a categorization system of collection entries over numerical content and textual annotation space in various taxonomy projections, which is a theoretically static corpus of structured query language standard (SQL). Although usability imperative dictates as complete shielding from implementation issues as possible, and thus implies a fixed frame, data storage interface extensions appear necessary either when submitted data do not decompose natively through reduced user interface, or when prevalent inner content organization technology gains user popularity, typically due to major facilitating hardware or virtualization middleware features newly available, such as data tagger standard coders in extended markup languages (XML), offering seamless maximal inclusion of implied content relation space for all data entries at arbitrary location of link hierarchy.

Practical data system organization, when actual computer implementation is included, such as with our system below*, proceeds in some compatibility aspect to machine instruction level. Thus for the maximal management system usability, templates for arbitrary system structure need to be enabled at the highest level, in particular system builder webpage on administration site, yet in direct translation relevance to the lowest system level (binary tabular data set content and organization that may span drive partitions or server machines). Internal programming implementation prefers (repeated) runtime evaluation wherever possible, such as data graph image assembly on the fly, content-actualized pop-up menus in structured navigation, or simply content listing pages through unrestricted instantiation of underlying query available as input value lists at low click level of indirection, to prevent retrieval time delays but provide overviews in usability option for open data systems.

The system unification work in series of past three years adopted open source free software application server on UNIX derived platform of Fedora Core with integrated packages of Postgres database management system engine (DBMS), Apache webserver, and layer connecting PHP hypertext preprocessor [1] along with continued work in science on physical data calculation [2].

Data server management gate has two locked privilege level phases, in particular amendment to database layout through online customization form, which automatically ensures meta-level template replication for entry input forms, formatted data file upload gate, and a search form with numerical data graphing module. When structuring a new data base layout, administrator provides the annotation equivalent to a web root subdirectory, free number of tables in various dimension layout, and customizes a number of label categories with particular

names for each annotation dimension, which is in fact equivalent to setting up a customary XML schema, and can thus be cataloged in such a way, alongside with currently implemented, program-encoded translation of administrator choices to SQL (cf. Fig. 1). Sub-database integration environmentally resolves to projection level of table search command, and table row input path composition in content relevance junction. Flexibility with respect to annotation categories, at font level including alphabets, is treated with Unicode symbol table. User customization beyond is basically twofold, either a new pictograph, or a field typesetting cascade, active in space union of scaled pictographs and font coding table. Menu selection layout and results here also fully map onto XML document in the related annotation schema of composition interface.

```
if(($con=pg_connect("dbname=metaone"))
if(pg_query($con,"CREATE DATABASE $dbname"))
```

Fig. 1. Preprocessor entry to database management system for data amendment that *also* defines a new markup category as underlined value of php variable `dbname`.

Since amendment to database layout merely requires table set extension (entry to layout core of database engine), while data input addresses particular tables and their fields through separately placed metaform instances, our system unification platform naturally stands as categorized storage instantiation with self recurrent features that provide for system data separation as required, layout customization, and mutually mirrored content input and data search functionality in structural hypercube of complete system. This naturally raises concern of terminological difference between data implementing SQL and text recording XML, in regard to query interface, browser integration, and server data allocation. While the latter solves in thin client view with XPath 2.0 (node selector on syntax constructs of elements, attributes, comments, processing instructions, namespaces, text, and documents) and XQuery 1.0, we adhere to DBMS on system implementation level, with simultaneous hypertext preprocessor embedding XML translator option. Such way has the power to utilize storage and retrieval robustness of DBMS, with a provision of XML equivalent copy.

Our ongoing contribution to various fusion science projects of coordination research center continues to be published electronically at institutional site below in order to complement current work series.

*Database server platform at <http://crdb.nifs.ac.jp/>

- 1) L. Pichl, M. Suzuki, M. Murata, D. Kato, I. Murakami, A. Sasaki, Literature Categorization System for Automated Database Retrieval of Scientific Articles Based on Dedicated Taxonomy, Data Mining for Design and Marketing, CRC Press, 2009 (Chapter 14, pages 223-234).
- 2) S. Fukata, M. Kimura, Y. Li, H.-P. Liebermann, R. J. Buenker, L. Pichl, Comparison of Charge Transfer in Proton Collisions with Methane and Silane for Simulations of Cold Plasma Impurities, Plasma and Fusion Research 3 (2008) S1040:1-3.