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# TECHNOLOGY BEHIND DEVELOPMENT OF BUSINESS-TO-LIBRARY SERVICES

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**ABSTRACT:** Complex relations in the technology age where business and libraries play key role require implementation of proper information management system that could empower and help increase their overall performance. The actual implementation of such system is a sophisticated procedure that must take into account current existing technologies and their particularities when dealing with such processes. This paper presents a comparative analysis of major working solutions and proposes a model of their usage, adapted to the specific library usage.

**KEY WORDS:** e-library, business, virtual information processing, PHP / MySQL system.

## 1. INTRODUCTION

Current report reveals details around the technology of providing online business-to-library services. It describes particularities happening when building a sample informational virtual library system. The suggested database structure allows maintenance of traditional library publishing services, bibliographic information input as well as support of an online community forum. Additionally the motives behind the usage of PHP as a programming language for its realisation are being presented.

## 2. BUSINESS APPLICATION

When we take a closer look of the relationships happening between business publishers and libraries the former could have certain interest towards particular subject and conclude a potential need of literature genres. This could be achieved by using statistical data provided by the virtual library such as: time of reading a particular article, number of comments, their average length and intent. This is illustrated in fig.1 showing an example online library book store.

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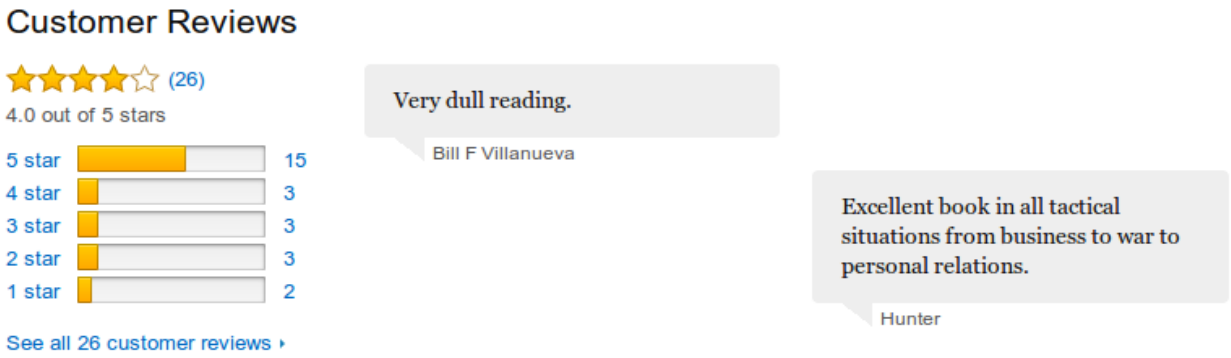


**Fig 1.** *Amazon.com book comments*

OTHER advantage of the B2L model allows publishers to suggest products similar to user interests and expectations based on user preferences and profiles.

LAST but not least the full-text searching inside every book in the library is the main benefit given to the business users as well as the authors. By examining comments to thematically related articles readers' needs and wishes could be also reflected into their next issues.

## 3. PHP LANGUAGE TECHNOLOGY OVERVIEW

PHP among many technologies allows implementation of a dynamic database driven web site. Its name comes from Hypertext Pre-processor. PHP is server executable script language and can be used together embedded with the popular HTML. PHP is sometimes referred as "open source ASP", because of its functional resemblance with Microsoft based language.

PHP is distributed as an official module to the APACHE HTTP Server[1] - leader in the free web servers market, used within 53% of the Word Wide Web. The implementation of the internal PHP pre-processor into the web server, leads to bigger performance gains in data processing. Similar to Apache Server, PHP is multi-platform and works under different operational systems such as: Unix, Linux, Windows and MacOS. All projects under the Apache Software Foundation – including PHP are named as open source software[2].

PHP is distributed as freeware product, and the combination of Apache, PHP and MYSQL is working successfully on old hardware which is unable to run IIS, ASP and SQL Server. The following table represents the ratio between financial requirements of products.

**Table 1.** *Comparison of popular system development product prices*

| LISTED PRODUCT PRICES | | | | |
|---|---|---|---|---|
| ***Language*** | ***ASP*** | ***ColdFusion*** | ***JSP*** | ***PHP*** |
| Development | $0-480 | $395 | $0 | $0 |
| Server | $620 | $1,295 | $0-595 | $0 |
| RDBMS | $1220-4200 | $0-10000 | $0-10000 | $0 |
| Support | $0-245 | $0-75 | $0-75 | $0 |

1 http://apache.org
2 http://php.net

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*Source: prepared by the author based on respective companies' websites*

THE leading characteristics of PHP as an open source product are not limited to the mentioned free usage. Its biggest advantage is that it could be compiled according to the configuration needs of a particular situation. This way it benefits regarding speed and security. The php interpreter could be recompiled as often as needed, for example when new version of Apache software becomes available, or there is a need of external libraries support.

OPEN source has always been a guarantee that PHP will endure in the future despite of its form. PHP is part of a huge project and will always has numerous volunteering developers, which will continue forward, in case the current team converts to paid commercial product.

PHP works well under every popular UNIX or Windows system. It is being compatible with the leading web-servers such as: Apache, NGINX and Microsoft Internet Information Server.

APACHE Server is usually referred as the most stable among the leading web servers and has a reputation of user-proof software. Although its administration is not fast and easy, once set up Apache works smoothly and reliably and almost never crashes. PHP inherits such reliance and adds its solid build on top.

WHEN being compiled as Apache module php experiences almost no increase in scripts execution time due to the interpretation, instead of the fastest method which is the compilation. The reason behind is that php works as an internal part of the http daemon so there is no data transfer between the apache server and the php interpreter which results in faster and efficient queries. PHP performance in most of the applications is way above its ASP counterpart[3], only leaving pre-compiled versions of C++ CGI scripts to achieve 10 times better executional performance[4].

PHP doesn't require from its developers deep understanding of main programming language in order to make ordinary database queries. The language has easy to understand, user-friendly syntax. Many of the most useful and specific language functions are predefined in libraries. Also in the language's help can be found numerous practical examples which can be easily modified.

PHP enriched pages are ordinary HTML pages, which turn in PHP mode when necessary. When a query is send to a page containing php code, the web server has to do a initial processing, while moving from top to bottom, searching for PHP sections for interpretation. This pre-processing returns to the user's browser web page written in normal HTML language.

USING such way of embedding has many beneficial assumptions:

- ⇨ php separates the work between programmers and front-end designers.
- ⇨ php could lower the development price and increase the productivity.

PHP language is being used in more than 250 million domains.

3 http://evolt.org
4 http://www.wrensoft.com/zoom/benchmarks.html

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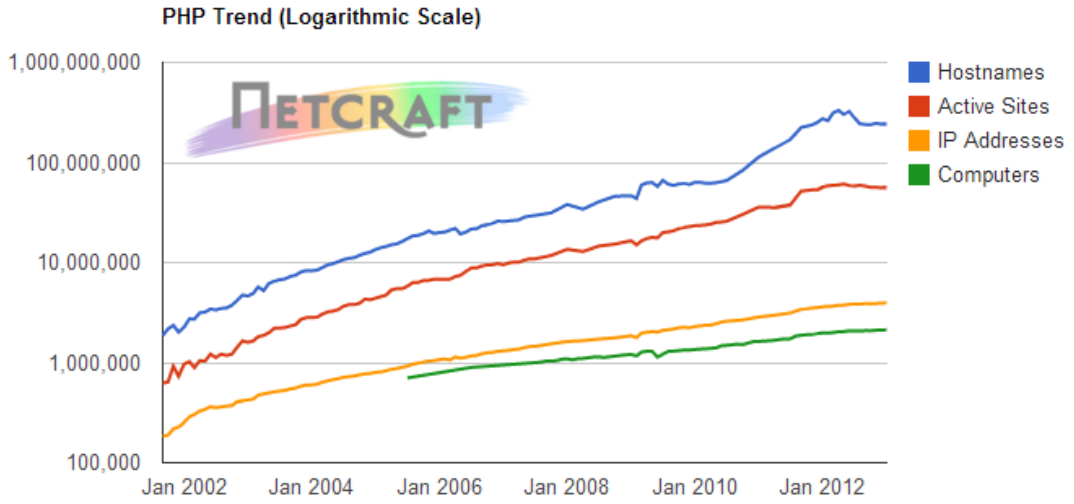


***Fig 2.*** *PHP language usage on websites in 2013*
*Source: http://netcraft.com*

PROBABLY the best feature of the interpreting languages is that the application doesn't require compilation to binary code before being tested and executed – the scripts are just written and started. PHP is interpreted, although its Zend supporting team does a hidden compilation in order to achieve better performance. Developers in need of compilation who want to distribute non-reversible binary code[5] (in order to not be used by other people) could use the optimized compiler aimed at big and complicated php scripts[6].

## 4. DATABASES

THE suggested virtual library information system consists of interconnected tables via their primary and foreign keys. Following is a description of the database tables.

TABLE **'Article_contents'** contains information surrounding particular article content, not forgetting the unique article_id field which ensures connection with table Articles. Such information separation into distinct tables is being done in order to increase the performance speed when doing full-text search.

**Table 2.** *Article_contents*

| TABLE NAME: ARTICLE_CONTENTS | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| Article_ID | Int(4) | Article identificator | Primary key<br>Requred |
| Article | Text | Article content | Required |
| Linked tables:<br>Article_contents-Articles: 1 : 1 | | | |

*Source: authors' work*

TABLE **Articles** includes information such as: author, publish date, genre, rate and embedded graphical images. Its connection with table Article_contents makes the inclusion of

5 http://www.brandonchecketts.com/archives/gnupg-encryption-with-php
6 http://www.zend.com/en/products/guard

the content together with the details of one article. Table Users is also connected in order to ensure exact information about article's author.

**Table 3.** *Articles*

| TABLE NAME: ARTICLES | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| Author_ID | Int(4) | Article's author identification number | Requred |
| Article_id | Int,(4) | Article incremental number | Primary key Required NOT NULL Auto_increment |
| Post_time | Date | Date of publication | Required |
| Genre | Varchar(10) | Article genre | Required |
| Article_head | Varchar(40) | Article heading | Required |
| Rate | Int(2) | Article rating | Required |
| Image_id | Int(4) | Identificator of embedded image | Required NOT NULL |
| Linked tables:<br>Articles-Article_contents: 1:1<br>Articles-Users M:M<br>Articles-Images 1:1 | | | |

*Source: authors' work*

TABLE **Users** consist of personal registration user data such as: username and password which are being used for authorisation, showing the current online state – whether the user is in the system as well as statistical information like: last visited date, IP address as well as user email.

**Table 4.** *Users*

| TABLE NAME: USERS | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| UID(user id) | Int(10) | Article's author identification number | Primary key unsigned DEFAULT '0000' NOT NULL Auto_increment Requred |
| Login | Varchar(8) | User name | Required |
| Pass | Varchar(8) | User password | Required |
| State | Int(1) | Current state – logged in / out | DEFAULT '0' |
| lastlogin | Date | Date and time of user's last visit | |
| userIp | Varchar(20) | User IP address | NOT NULL |
| dateAdded | Timestamp | Registration date | |
| mail | Varchar(30) | User e-mail | NOT NULL |
| Linked tables:<br>Users-Comments: 1 : M<br>Users-Articles: 1 : M | | | |

*Source: authors' work*

TABLE **Comments** is used to save specific article and general system comments, thus providing practical communication between different users. There is a need of authorisation rules applied prior actual information publishing in order to increase the security level as well to provide easier identification of the authors.

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**Table 5.** *Comments*

| TABLE NAME: COMMENTS | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| Comment_ID | Int(10) | Comment's identification number | Primary key<br>Requred<br>unsigned DEFAULT '0000'<br>NOT NULL auto_increment |
| Article_ID | Int(4) | Foreign key – article unique identification number | Required |
| UID | Int(4) | Unique ID of comment's author | Required |
| Comment_head | Varchar(30) | Comment heading | Required |
| Comment | Text | Comment content | Required |
| Rate | Int(2) | rating/grade | NOT NULL |
| Linked tables:<br>Comments – Subcomments: 1 : M<br>Comments - Artciles: M : 1 | | | |

*Source: authors' work*

TABLE **Sub_comments** includes data of replies to already published comments. The inclusion of second table is done in order to provide full functionality to the 'forum' allowing communication between users.

**Table 6.** *Sub_comments*

| TABLE NAME: SUB_COMMENTS | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| Subcomment_id | Int(4) | Sub-comment's identification number | Primary key<br>Unsigned DEFAULT '0000'<br>NOT NULL auto_increment |
| Uid | Int(4) | Sub-comment unique user identification number | Required |
| Comment_id | Int(4) | Foreign key – comment number | NOT NULL<br>Required |
| Subcomment_head | Varchar(30) | Sub comment heading | |
| Subcomment | Text | Subcomment content | |
| Publish_date | Date | Date when sub comment was published | |
| Rate | Int(2) | rating/grade | Required<br>NOT NULL |
| Linked tables:<br>Sub_Comments-Users M:M<br>Sub_Comments- Comments M :1 | | | |

*Source: authors' work*

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TABLE **Offers** is saving the content of actual offers (suggestions) that users might have.

**Table 7.** *Offers*

| TABLE NAME: OFFERS | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| Offer_id | Int(4) | Unique ID offer number | Primary key unsigned DEFAULT '0000' NOT NULL auto_increment |
| UID | Int(4) | Foreign key - user identification number | Required |
| Publish_date | Date | Publish date | Required |
| Offer_head | Varchar(30) | Offer header | |
| Offer_text<br>Linked tables:<br>Offers-Users: M : 1 | text | Offer's fulltext | Required |

*Source: authors' work*

TABLE **Unregusers** provides correct enumeration of all library users currently online within the system. The field DateAdded has special type of timestamp, ensuring the correct user count. Comparison is made between the current time and the recorded time when user enters the system. If the difference between the two is greater than 20min. this means that the user has left the system. As a result of continuous checks periodically new IP addresses which identify the users are being inserted into the table. After some time chosen by the administrator a deletion of old records is being made in order not to increase size.

**Table 8.** *Unregusers*

| TABLE NAME: UNREGUSERS | | | |
|---|---|---|---|
| Field name | Data type (lenght) | Field description | Field properties |
| ID | int | user identification number | Primary key, auto_increment, not null, Requred |
| UserIp | Varchar(20) | User IP-адрес | Not null |
| DateAdded | timestamp | Date and time of visit | Required |

*Source: authors' work*

## 5. CONCLUSION

HEREBY presented opinions on the choice of development technology for virtual information system support the practical realisation of business-library type online relations. As a result the system allows free publishing, reading and sharing of articles, making easy information dissemination and communication between authors and users, as well as increases the area of informational search – by interconnecting libraries in near future.

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