



COVER SHEET

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Information Systems, Computer Studies & Tux

This article looks at an alternative way of teaching information systems with the availability of free software. It also looks at how students studying Information Processing and Technology (IPT), Information Technology Systems (ITS) and/or Computer Studies can work together collaboratively. Particular attention will be given to that of information systems (a component of IPT) and network administration (a component of ITS). While this is intended to be a brief document in setting up a project for IPT and ITS students, some background to information systems is also given.

Information Systems

According to Olle (1991:232) an information system is essentially a means of “recording and communicating information to satisfy the requirements of all its users”. Hence, it is within this context that Date (1990:3) further claims that the terms data and information are often treated as synonymous and that a database system performs this duty. Date (1990:3) claims that the overall purpose of a database system is to maintain information and make that information available on demand. A database is an all-encompassing term that describes anything from an “address book, recipe box, dictionary or a filing cabinet to a set of computerised data files with sophisticated data relationships” (Sharp 1993:113).

Information available to people today has grown exponentially (Hilton 1992:x) and since a teacher or individual cannot possibly retain all the information available today, it is imperative that one develops skills in finding, interpreting and updating the required information (Sharp 1993:113). Databases are used in many facets of society by an array of people, ranging from professionals to students to researchers to individual members of the public. The “justification for using databases is that when searching for information manually, not only can the process be slow, but unnecessary information must be searched through until the relevant information is located” (Guttormsen 1986:45).

The Internet and in particular the Wide World Web (WWW) has further changed the way in which we access various sources of information. Library catalogues, indexes and databases of websites, shopping stores, radio and music stations, timetables for movies, transport and other events, education training materials and a plethora of other information and services is all available online. Access to these resources has also increased with a 35 to 95 percent increase in access to the Internet in school classrooms between 1994 and 1998 (William, 2000). However, much of the information and many of the services available on the Internet involves some type of database management software. What has changed significantly is the way in which these systems are created, managed and interfaced. Hence, the need for students to be aware of these systems.

Communities of Practice

Communities of practice allow learners to develop skills and knowledge, which they can share with other members of those communities (Jonassen, 1996). Further, when students are “confronted with meaningful, real world problems, learning communities apply sophisticated repertoires of knowledge” (Jonassen, 1996, p. 60). Based on the assumptions associated with cognitive apprenticeship and the “social constructivist perspective implied by communities of learners” (p. 60), Jonassen identifies what he terms as ‘seven qualities of meaningful learning’ (See figure 1). These include;

- Active – learners are engaged in by the learning process
- Constructive – Learners accommodate new ideas into prior knowledge in order to make sense, make meaning or reconcile a discrepancy, curiosity, or puzzlement
- Collaborative – learners work in learning and knowledge building communities, exploiting each others skills while providing social support and modelling and observing the contributions of each member
- Intentional – learners are actively and wilfully trying to achieve a cognitive objective
- Conversational – learning is inherently a social dialogical process
- Contextualised – learning tasks are situated in some meaningful real world task or are simulated through some case-based or problem based learning environment
- Reflective – Learners articulate what they have learned and reflect on the processes and decisions that were entailed by the process

An Alternative Approach

It is within this model of meaningful learning that this approach to teaching information systems is proposed. The teaching of information systems often requires the use of database management software such as Msql or Microsoft Access (there are many others). With this software students build a database on a particular topic (such as a pizza shop ordering system or a library system) where they produce tables, relationships between the tables, sql queries and user interfaces. While this is practical and an essential skill we can further extend these ideas and incorporate the students knowledge of algorithms and programming into a major project that looks at the development of database driven websites. It is not necessary to include the programming section but it aids in the understanding of how the databases can be developed for presenting information on the web. The ITS or computing studies students could be responsible for the set up of the server and the administrative tasks such as data back up, maintenance, and user accounts (for the IPT students).

The proposed model requires students from ITS or computer studies to work with students from IPT so that a relationship is formed and an authentic, real world activity is taking place where the ITS students have actual clients that are dependent on their services. The students from ITS are responsible for the server set up and maintenance while students from IPT use the server for development of their database and web interface. While this method helps students in ITS undertake the network administrators part of their course, it is not necessary – you may opt to set up and administer the server yourself. However, having the students work together presents each of them meaningful learning tasks. You do not have to involve ITS students, but

it is a good way to promote a community of practice where students are learning from each other and being involved in an authentic learning activity.

Software Requirements and setting up the environment

Due to the current conversations on QSITE-Lan and the popularity of Linux as a web server on the WWW (see <http://www.netcraft.com>), I have opted to use it for a production environment for this approach to information systems and database driven websites. I have opted to use a Redhat 7.2 distribution of linux (there are others such as Mandrake, SUSE or Debian which would also suffice) with an Apache Web server, PHP 4.0 and MYSQL. You could use Postgresql instead of MYSQL, however I have chosen MYSQL, as it is a commonly used database for database driven web design on the WWW. The software is free and very functional. While MYSQL has most of the functionality needed (especially for IPT Students) there is some sql that it does not support, however, the new version will support all sql. PHP is the abbreviation for Hypertext Preprocessor and is a server side html embedded scripting language used for creating dynamic web pages.

While state schools and some private schools are under a Microsoft agreement – this article could well be written using Internet Information Server (IIS) with Active Server Pages (ASP) or ASP.NET and Microsoft Access or even Microsoft SQL Server. However, there is a cost and the process to connecting to the database and working with it varies greatly.

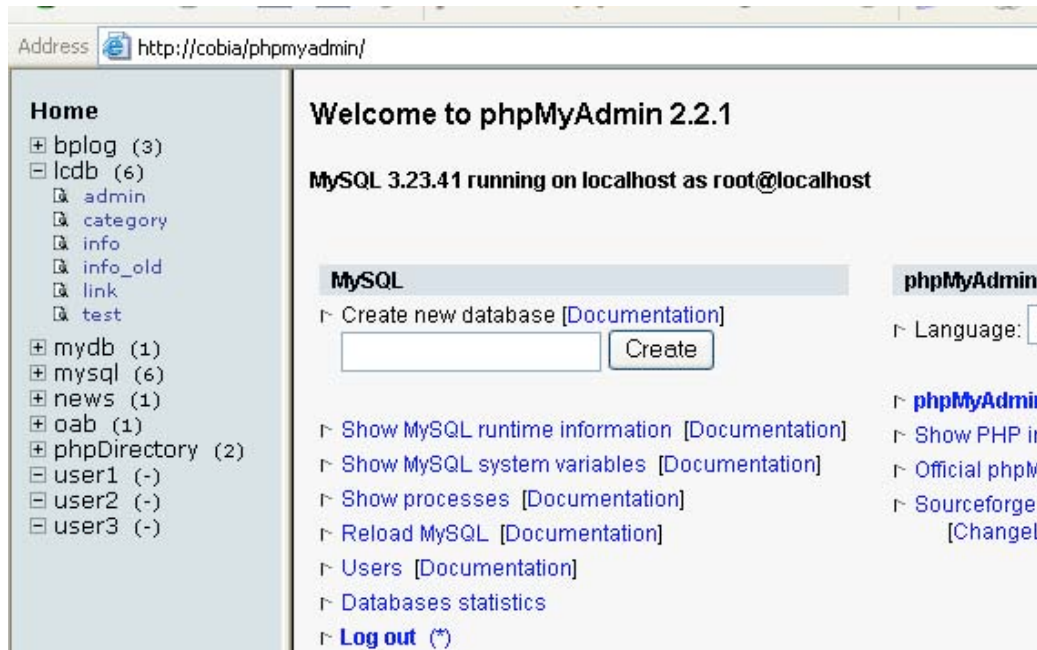
Ok – so there are some of you out there that balk at the idea of setting up a Linux server for use on the school network and agreeably so – I used to be one of these people. You can download Redhat Linux (<http://www.redhat.com>) or Mandrake Linux (<http://www.linux-mandrake.com/en/>) for free or you can purchase a boxed set from a retail outlet (I'm told it varies between \$30 - \$70). You can also purchase a pocketbook guide to using Linux from a newsagent for approximately \$20, which includes several versions of Linux.

The test setup that I used with my students was a Pentium 400 with 64mb ram (it will run quite well on some older systems which is suitable for a test server for students). Within an hour of starting the install (the set up has become simpler with a nice GUI), I was able to add the current students as users on the server, which gave them a specified disk storage space and the ability to use MYSQL as well as a public space for their web design interface to the database. If you are unfamiliar with setting up users and are after a simple program for Linux there is a program called Createusers which is available for a free download from <http://www.lfsp.org/>. This program also gives you instructions on how to set up MYSQL and a public web space for students.

Interacting with the Database – the task

After the server set up has been completed and users added, students can now access the server for their task and/or setting up test databases. As you may have done previously, you can set a task for students to create a library catalogue or a pizza shop ordering system or just leave the task open ended. The task is still very similar to before, it is only the environment that has changed so far. The web interface component can be set up at a later date depending on the available time.

Interacting with the database can occur in many ways, however I will assume most schools operate a workstation with MS windows. Students may access the database via a web-based form such as phpMyAdmin or by using a MYSQL client program such as MYSQL Front. The following image illustrates the web interface with the MYSQL database. From here students can perform all database tasks. Even though other users are visible they are not accessible.



The following screenshot from phpMyAdmin illustrates how easy it is to use sql to create a table or even database. The files for installation of this web-based database administration software on your server are available from <http://www.phpwizard.net/projects/phpMyAdmin/>

Database news

Table	Action	Records
<input type="checkbox"/> articles	Browse Select Insert Properties Drop Empty	1
1 table(s)	Sum	1

With selected: Or

- [Print view](#)
- Run SQL query/queries on database news [\[Documentation\]](#) :


```
CREATE TABLE link (
  link_id int(9) unsigned NOT NULL
  auto_increment,
  category smallint(5) unsigned NOT
  NULL default '0',
  title char(64) NOT NULL default '',
  url char(128) NOT NULL default ''
```

 Show this query here again
 Or Location of the textfile :

While the web is an easy interface to access the MYSQL database, it is also possible to access it via telnet and issue sql commands from here..

```
Telnet 192.168.1.100
Connection id: 8
Current database: lcdb

mysql> show tables
-> ;
+-----+
| Tables_in_lcdb |
+-----+
| admin          |
| category       |
| info           |
| info_old       |
| link           |
| test           |
+-----+
6 rows in set (0.00 sec)

mysql> select count(*) from category;
+-----+
| count(*) |
+-----+
| 1 |
+-----+
1 row in set (0.00 sec)
```

If you are after an application that you can install on your windows client which has a user friendly interface and shows tables and data in a similar way to other database management software there are many clients available. The one illustrated below shows a MYSQL database accessed using MYSQL Front which is available from <http://anse.de/mysqlfront/>

localhost - /lcdb/category

root@192.168.1.100

- lcdb
 - admin
 - category
 - info
 - info_old
 - link
 - test
- mysql
- oab

Host Database Table Data Query

lcdb / category: 1 Records (1 retrieved)

category_id	category	parent	cor
1	Links to nearby attra		0

SQL

```
27 SHOW FIELDS FROM `info`
28 SHOW KEYS FROM `info`
29 SHOW FIELDS FROM `category`
30 SHOW KEYS FROM `category`
31 SELECT COUNT(*) FROM `category`
32 SELECT * FROM category LIMIT 0, 50
33 SELECT COUNT(*) FROM `category`
34 SELECT * FROM category LIMIT 0, 50
```

BLOB

Filter

Where to now?

While students may have completed all the necessary requirements for the topic of information systems it is now possible to use PHP to interact with the database. While PHP is an html embedded language it is also a language that can be used to write client side GUI applications. While it is beyond the scope of this article to provide coding for connecting to the database and building various user interfaces there are many examples available at <http://www.php.net> and <http://www.mysql.com/articles/>. Students could use an html editor or a text editor such as notepad to create a simple page that connects to the database and interacts with it. Students can then ftp this file into their public html folder on the linux server.

Using Linux as an alternative to other operating systems and sometimes expensive software allows students to gain hands on experience in database design, programming, network administration and working in online environments while fulfilling the requirements of the various syllabus documents. It also provides students with real world examples. Perhaps your students could develop part of a database driven intranet for your school that is tailored to the schools requirements.

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