

# Real-time IFRS system implementation with PHP and MySQL

## (August 2018)

*Doyun Jung*

**Abstract**— Currently, many accounting systems still require a lot of data and information, and they are processed in spreadsheets like traditional data processing. The accounting system refers to IFRS. IFRS, an accounting system, is an international accounting standard applied to an entity's financial system. If you apply a database system to information called accounting, you can have real-time properties. Utilizing the characteristics of the database system, it has been carried out the study. Database engines supported by the MySQL 5.0.77-community-nt database program include MyISAM , memory, BLACKHOLE, ARCHIVE, FEDERATED, and MRG\_MYISAM. Apply the MyISAM engine has improved a system that improves the limitations of such data onto existing spreadsheets to process and can have a real-time utilizing PHP and MySQL.

**Index Terms**— Object-oriented programming, DBMS, PHP Programming, IFRS, International Financial Reporting System, SpreadSheet, MySQL, MySQL5.0.77-community-nt database, MyISAM

## 1 INTRODUCTION

There are currently dozens of relational databases , including MySQL, MSSQL, Cubrid, and Oracle. The key to these databases is the engine. The MySQL 5.0.77 community - NT version supports six engines. MyISAM , BLACKHOLE , ARCHIVE , FEDERATED , and MRG\_MYISAM. The existing data structure of spreadsheet has file based data. For example, it consists of a single file, such as xlsx, which consists of a database called a sheet. The limitation of Xlsx is that there is row and column memory limitations. The problem with xlsx, the most commonly used extension of spreadsheets, is that the programming process is complex and very slow. To improve these problems, we argue that we can solve them by methods such as data structures. IFRS is an international accounting standard and an accounting standard. The IFRS system, also called the financial statements, must satisfy four main criteria. Financial statements, income statement, cash flow statement, and capital statement. To generate a report on these four items, basic information is required. There should be at least one piece of basic information called a household part. An accounting report is a system that can derive useful information about the financial situation from a manager, investor, stakeholder, etc , in a small way . Using PHP and MySQL programs, it seems to be possible to improve the existing problems with the spreadsheet structure and to process knowledge information more efficiently.

## 1 PHP: HYPERTEXT PREPROCESSOR

PHP is a hypertext-based programming language that makes it easy to write code with object-oriented programming. As a code to show you how to use PHP, the code output from 0 to 5.

```
<?php
```

```
$i = 1;
$max = 5;
for ( $i = 0; $i < $max; $i++)
?>
```

It is a way to write code in object-oriented programming form of PHP .

```
<?php
Class hama{
    public function __construct(){
    }
    public function __destruct(){
    }
}
?>
```

This is the code used when you are programming in MySQL based on PHP.

```
<?php
// we connect to example.com and port 3307
$link = mysql_connect('example.com:3307',
'mysql_user', 'mysql_password');
if (!$link) {
    die('Could not connect: ' . mysql_error());
}
echo 'Connected successfully';
mysql_close($link);

// we connect to localhost at port 3307
$link = mysql_connect('127.0.0.1:3307', 'mysql_user',
'mysql_password');
if (!$link) {
    die('Could not connect: ' . mysql_error());
}
echo 'Connected successfully';
```

```
mysql_close($link);
?>
```

With PHP, you can develop your program quickly and easily.

## 2 MYSQL: ENGINE MYISAM

MySQL is a relational database program. MyISAM in MySQL 5.096 is the default storage engine.

It is based on the older (and no longer available) ISAM storage engine but has many useful extensions.

Each MyISAM table is stored on disk in three files. The files have names that begin with the table name and have an extension to indicate the file type. An .frm file stores the table format. The data file has an .MYD (MYData) extension. The index file has an .MYI (MYIndex) extension.

To specify explicitly that you want a MyISAM table, indicate that with an ENGINE table option:

```
CREATE TABLE t (i INT) ENGINE = MYISAM;
```

The older term TYPE is supported as a synonym for ENGINE for backward compatibility, but ENGINE is the preferred term and TYPE is deprecated.

You can check or repair MyISAM tables with the mysqlcheck client or myisamchk utility. You can also compress MyISAM tables with myisampack to take up much less space.

MyISAM tables have the following characteristics:

- All data values are stored with the low byte first. This makes the data machine and operating system independent. The only requirements for binary portability are that the machine uses two's-complement signed integers and IEEE floating-point format. These requirements are widely used among mainstream machines. Binary compatibility might not be applicable to embedded systems, which sometimes have peculiar processors.
- There is no significant speed penalty for storing data low byte first; the bytes in a table row normally are unaligned and it takes little more processing to read an unaligned byte in order than in reverse order. Also, the code in the server that fetches column values is not time critical compared to other code.
- All numeric key values are stored with the high byte first to permit better index compression.
- Large files (up to 63-bit file length) are supported on file systems and operating systems that support large files.
- There is a limit of 232 (~4.295E+09) rows in a MyISAM table.

## 3 B-TREE : DATA STRUCTURE

In computer science , a B + tree (Quaternary Tree ) is one of the tree data structures of representing sorted data onto efficient insertion , retrieval and deletion of records each identified by a key . The B + tree is dynamic and consists of a multilevel index with the maximum and

minimum number of keys to / of each index segment (usually a block or node).

In contrast to the B tree, the B + tree has all the records aligned to the lowest level of the tree. Only keys are stored in the inner block. An important value of B + trees is that they can be efficiently retrieved from block-oriented storage contexts (eg filesystems).

This is because the about of the B + tree node (the number of child nodes of one node) is much higher than that of the binary search tree, thereby reducing the number of I / O operations required for the search.

All of the above file systems use the B + tree type of block indexing. Relational databases also use B + tree types for table indexes occasionally.

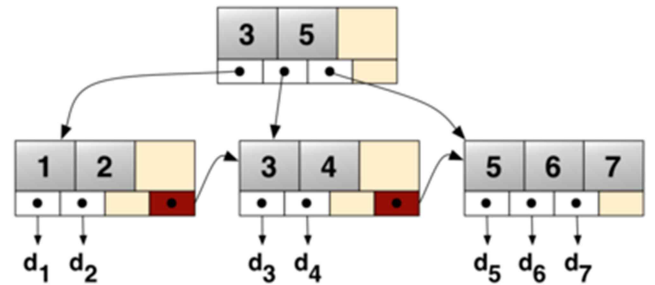


Fig 1. B + Tree structure

## 4 SPREADSHEETS : ROW BY COL

Currently, spreadsheets are used extensively in so many places. The key components of these spreadsheets are the rows and columns of the sheet. As an example of a spreadsheet, Microsoft Office Excel 2007 has a memory limit.

Feature	Maximum limit
Open workbooks	Limited by available memory and system resources
Total number of rows and columns on a worksheet	1,048,576 rows by 16,384 columns
Column width	255 characters
Row height	409 points
Page breaks	1,026 horizontal and vertical
Processor Cores	64

Fig 2. Worksheet and workbook specifications and limits

## 5 IFRS : INTERNATIONAL FINANCIAL REPORTING STANDARDS.

International Financial Reporting Standards (IFRS) are standards issued by the IFRS Foundation and the International Accounting Standards Board (IASB) to provide a common global language for business affairs so that company accounts are understandable and comparable across international boundaries. They are a consequence of growing international shareholding and trade and are particularly important for companies that have dealings in several countries.

## 6 IFRS : ELEMENTS OF FINANCIAL STATEMENTS

The factors directly related to the measurement of the statement of financial position are as follows. An asset is an asset for which an asset is controlled by a past event and is expected to have future economic benefits. Debt is the entity's current obligation arising from past events, and is the time when the settlement is expected to yield assets with guaranteed economic benefits, ie assets. Capital is the residual equity of an asset after deducting all liabilities with nominal value.

Statement of Profit / Loss is a document that reports financial performance. This document can largely derive the outcome of financial performance by items of income, cost, and tax. Costs are a reduction in the economic benefit of the accounting period, such as outflows, depletion of assets or the generation of debt that results in a decrease in capital.

## 7 IFRS : REQUIREMENT

IFRSs are functionally established when they have four items, mandatory elements, and indexes. In order to process knowledge information about database, financial statement, income statement and comprehensive income statement, capital change table and cash flow statement are required.

For reference, IFRS financial statements consist of (IAS 1.8).

Fig 3 shows the report form and formula structure of the financial statement.

Financial Statement { \$endDate = YYYY-MM-DD }	
Asset	Debt = {categoryDebt1 + categoryDebtN}
{categoryAsset1}	{categoryDebt1}
{categoryAsset2}	{categoryDebtN}
{categoryAsset3}	Capital = {categoryCapital1} + {categoryCapital2} + {categoryCapitalSP}
{categoryAsset4}	{categoryCapital1}
...	{categoryCapital2}
{categoryAssetN}	{categoryCapitalSP}
	= $\sum \text{categoryAsset} -$

	$\sum \text{categoryDebt} - (\text{categoryCapital1} + \text{categoryCapital2})$
Asset = $\sum \text{categoryAsset}$	Asset = if ( Asset == (Debt + Capital) }

Fig 3. Financial Statement

Fig 4 shows the report form with logical expression of profit and loss and loss status table.

Profit and loss statement (\$startDate)~(\$endDate)	
Income	$\sum \text{categoryValue I}$
$\sum \text{category I}$	CategoryValueI{n}
Expenditure	$\sum \text{category ValueE}$
$\sum \text{categoryE}$	CategoryValueE{n}
Profit and loss (Tax income before)	income – Expenditure
Tax	tax Value
Profit and loss (Tax deducted)	(income – expediture) – tax

Fig 4. Profit and loss statement

Figure 6 shows the cash flow statement. The assertion was established in several configurations. A somewhat more complicated point in the cash flow statement is that we need information about the cash flow at the start date.

Cashflow statement (\$startDate)~(\$endDate)	
<b>1. Income</b>	\$income = \$income – Expenditu re
<b>Cost without cash flow</b>	
- Depreciation cost	\$value1
- Loss on disposal of fixtures	\$value2      \$lod = \$value1 + \$value2
<b>Revenue without cash flow</b>	
- Interest revenue	\$interestR evenue = \$value
<b>Changes in</b>	

<b>assets and liabilities due to operating activities</b>			
- Accounts Receivable	\$value1		
- Inventories	\$value2		
- Accounts Payable	-\$value3	\$accountPay = \$value1 + \$value2 + \$value3	
<b>Cash generated from sales</b>		\$cash = \$income - \$lod - \$interestRevenue - \$accountPay	
- Interest payment		\$iPay = \$value1	
- Tax payment		\$tax = \$tResult = \$cash - \$iPay - \$tax	

## 2. Investment activity cash flow

<b>Cash inflows from investing activities</b>			
- Disposal of fixtures	\$dof = \$value		
<b>Addition of expenses without cash outflow</b>			
- Acquisition of equipment	\$acquisitionEq = \$value	\$result = \$dof + \$acquisitionEq	
....			
<b>Cash and cash equivalents</b>		\$cashEq = \$tResult + \$result	
<b>startDate{ Cash and cash equivalents }</b>		\$startDateResult = \$query1(\$startDate)	
<b>endDate{ Cash and cash equivalents }</b>		\$endDateResult	

<b>cash equivalents }</b>	= \$cashEq + \$startDateResult
---------------------------	--------------------------------

Fig 5. Cash flow statement

Figure 6 shows the change in assets.

<b>Changes in equity (\$startDate)~(\$endDate)</b>			
	Capital	Retained Earnings	Total
<b>\$startDate</b>			
<b>{ \$capital.category1 }</b>	\$value1		\$value1
<b>{ \$capital.category2 }</b>	\$value2		\$value2
<b>{ \$capital.categoryn }</b>	\$valueN		\$value3
<b>Net income / Net loss</b>		{ \$incomeandloss.profit }	{ \$incomeandloss.profit }
<b>Cash Divided</b>		\$capital.divided	$\sum$ cashDiv
<b>Total \$endDate</b>	$\sum$ capital	$\sum$ earning	\$capital + \$earning

Fig 6. Changes in equity

In Figure 6, "\$capital.divided" and "\$ capital + \$earning" are color-coded and require logical verification. Performing some verification with control statements such as If can work with a complete IFRS system.

## 8 IMPLEMENTATION

It devised an abstract data type structure that can be used in common for the IFRS "financial position", "income statement", "cash flow statement", "changes in equity".

```

abstract class IAccount{
    abstract public function sumOfvalue($type,
    $category, $boardName, $startDate, $endDate);
    abstract public function prevBalance($boardName, $targetDate);
    abstract public function listContent($boardName,
    $startDate, $endDate, $userName, $balance);
    abstract public function write($boardName,
    $account);
    abstract public function modify($boardName,
    $account);
    abstract public function remove($boardName,
    $account);
}

```

Fig 7. IAccount - abstract type structure

In the case of the function "sumOfvalue" in the ADT, data on the sum can be derived. The function "prevBalance()" can be output for the previous sum of the balances. The important thing that functions have in common is information about dates.

## 9 CATEGORY

The duplicate function items of the IFRS report are minimized and the items are classified into the following structures.

```
Class Category{
    private $minSizeType;    // Income, ..., Asset - Min
    private $maxSizeType;    // Income, ..., Asset - Max

    private $minSizeACategory; // Income - Min
    private $maxSizeACategory; // Income - Max
    private $minSizeBCategory; // Outcome - Min
    private $maxSizeBCategory; // Outcome - Max
    private $minSizeCCategory; // Capital - Min
    private $maxSizeCCategory; // Capital - Max
    private $minSizeDCategory; // Debt - Min
    private $maxSizeDCategory; // Debt - Max
    private $minSizeECategory; // Asset - Min
    private $maxSizeECategory; // Asset - Max
}
```

Fig 8. Category – Pseudocode

Figure 8 can determine the size in the form of min and max in order to classify the items related to categories in common. The structure of these categories is important to handle the knowledge base data that AccountBook needs for IFRS.

## 10 ACCOUNTBOOK

Figure 9 shows the ADT design for AccountBook.

```
class AccountBook{
    private $id;
    private $type;
    private $category;
    private $subject;
    private $price;
    private $taxRate;
    private $count;
    private $regidate;
}
```

Fig 9. AccountBook – abstract type structure

The information in the AccountBook can be used to efficiently derive the IFRS report.

## 11 FOR PROCESSING DATA SQL

This is the code for SQL implemented in the listContent () function.

```
$query = "SELECT id, type, category, accountName,
```

```
accountNo, " .
"subject, price, taxRate, count, regidate " .
"FROM account_%s WHERE regidate BETWEEN '%s'
AND '%s' ORDER BY regidate, id ASC");
```

Fig 10. listConent() – SQL

"PrevBalance(\$tableID, \$targetDate)" function within the SQL code implementation.

```
$query = "SELECT id, type, subject, accountName,
accountNo, " .
"price, taxRate, count, regidate " .
"FROM account_%s WHERE regidate BETWEEN
'%s' AND '%s' ORDER BY regidate, id ASC";
```

Fig 11. prevBalance(\$tableID, \$startDate, \$endDate) – SQL

In the "prevBalance()" function, we introduce the logical expression that supports the SQL statement. The sum of the previous information is required to know the previous sum.

```
while($row= fetch($result) ) {

    $sumOfPrice = $row['price'] * $row['count'];
    $sumOfPriceTax = $sumOfPrice * $row['taxRate'];
    $resultOfPrice = $sumOfPrice + $sumOfPriceTax;

    if ($index == 0){
        $tmp_price = $resultOfPrice;
    }

    if ($index != 0){
        $resultOfPrice = $calculate( $row['type'],
        $tmp_price, $resultOfPrice );
        $tmp_price = $resultOfPrice;
    }

    $index = $index + 1;
}
```

Fig 12. prevBalance() - Logics

The logic in Figure 13 is the logic of ifrsSystem. "7. Requirement" to computer code.

```
/// 0. Common Variable
$usrType;
$category;
/// 1. Balance Sheets
// Left
$usrType = $accountFn->getSearchTypeID('Asset');
$b_l_balance = $ifrsAccount->prevBalance($id,
$endDate); // Balance

$category = $accountFn->getSearchCategoryID($usrType, 'Land');
$b_l_land = $jasper->sumOfvalue($usrType,
$category, $boardName, $initialStartDate, $endDate);
$category = $accountFn->getSearchCategoryID($usrType,
'Accounts Receivable');
$b_l_ar = $ifrsAccount->sumOfvalue($usrType,
```

```
$category, $boardName, $initialStartDate, $endDate);
.....
```

Fig 13. IFRSSystem.php – Pseudocode

Looks to do the query many times. In the pseudocode shown in Fig 13, the readability is expressed in a form that can be understood by a person.

## 12 DATA MODEL

The relationship between the model types and categories on the basis of Figure 8 was defined as shown in Figure 14.

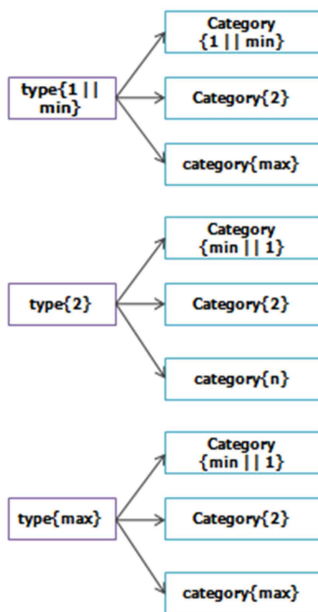


Fig 14. Relationship between type and category

The relationship between type and category plays a very important role in generating an IFRS report. It is a classification that can be used commonly in financial statement, income statement, cash flow statement, capital statement. By establishing this classification system, redundancy of data can be eliminated.

## 13 PERFORMANCE

Performance can be said to be important to knowledge-based data processing. The time it takes to print the IFRS report was measured.

num	type	Count	sec(Print)	sec(PHP)
1	Website	100,000	5.5	0.000771
2	Website	250,000	5.5	0.00061
3	Website	500,000	26	0.000752

4	Website	1,040,350	51	0.000608
---	---------	-----------	----	----------

Fig 15. Performance measurement result

The results were output on PHP and "Print" in the chart .

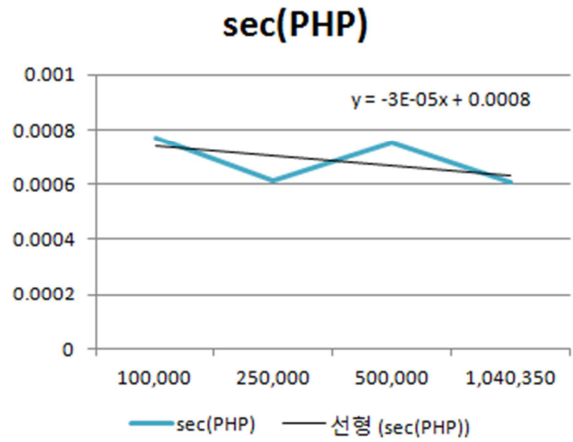


Fig 16. Results measured in PHP (in seconds)

The result measured in Figure 16 is inserted into the actual number in Figure 15 as Insert command in MySQL. This is the result of performing the data processing on the actual computer.

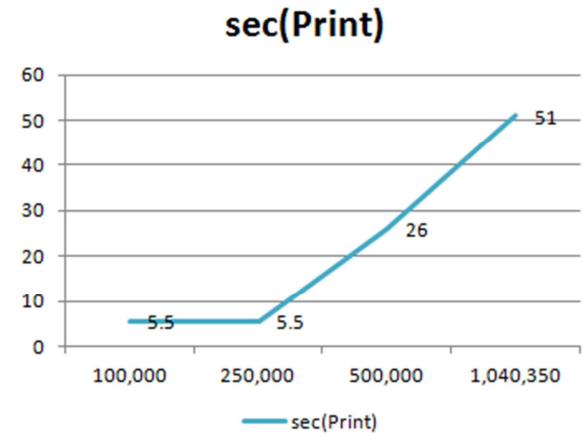


Fig 17. Measured result in user screen (unit: second)

Figure 17 shows the results from the data in Figure 15. Figure 16 and Figure 16 show the data obtained from one experiment. The difference between "sec(print)" and "sec(PHP)" is measured by sec(print) and sec(PHP). Analyzing Figure 17, we could obtain about twice the experimental results in 500,000 and 1 million inquiries.

## 14 CONCLUSION

In generating the IFRS report, it was possible to improve the waste of individual information classification. In addition to, by processing the accounting standard report in real time, the integrity of the database and other characteristics have been applied to establish the basis for processing knowledge information . Data mining is likely to be more efficient than creating an IFRS report that has this feature in an

existing spreadsheet. If the reporting system of IFRS can provide better performance, we can expect more productive data processing.

ACKNOWLEDGMENT

The author would like to convey a word of thank you to the parents while performing the research.

REFERENCES

[1] MySQL, "MySQL 5.0 Reference Manual" <https://downloads.mysql.com/docs/refman-5.0-en.pdf>. 2016.

[2] PHP, "PHP: mysql\_connect - Manual" <http://php.net/manual/en/function.mysql-connect.php>. 2011.


[3] Microsoft, "Excel specifications and limits - Excel" <https://support.office.com/en-us/article/excel-specifications-and-limits-1672b34d-7043-467e-8e27-269d656771c3?ui=en-US&rs=en-US&ad=US>. 2018.

[4] Wikipedia, "International Financial Reporting Standards" [https://en.wikipedia.org/wiki/International\\_Financial\\_Reporting\\_Standards#Concepts\\_of\\_capital](https://en.wikipedia.org/wiki/International_Financial_Reporting_Standards#Concepts_of_capital). 2018.

[5] Wikipedia, "B+ tree" [https://en.wikipedia.org/wiki/B+\\_tree](https://en.wikipedia.org/wiki/B+_tree). 2018.

[6] Microsoft, "Excel 사양 및 제한 - Excel" <https://support.office.com/ko-kr/article/excel-%EC%82%AC%EC%96%91-%EB%B0%8F-%EC%A0%9C%ED%95%9C-1672b34d-7043-467e-8e27-269d656771c3>. 2018.

[7] Hyoik Lee, Gwan Choi, Wonsun Baek, *IFRS accounting principles*. Shinyoungsa, pp. 12-13, 18, 21-22, 2010

	<p><b>First Doyun Jung</b> studied software engineering, business administration.</p> <p>Doyun Jung is my stage name. PHP, C ++, MySQL, Java, and C #. I am also interested in open source Linux. I like math and pizza.</p>
---	--