

# Optimizing MySQL Database System on Information Systems Research , Publications and Community Service

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**Abstract**— MySQL is the most trusted and depended-on open source database platform in use today. Many of the most popular and highly-trafficked websites in the world are built on MySQL because of its ubiquity across heterogeneous platforms and application stacks and for its well-known performance, reliability and ease of use. Research, publications and community service is one activity that is managed by the Institute for Research and Community Service. The process of managing these activities today cannot be separated from the Internet, therefore we need a system that can manage every activity. To obtain the proper management it needs a system that is supported by the database system is also good. This paper discusses how to conduct the process of optimizing the database system so that when the data is accessed does not affect the performance of server systems. Process optimization is done on the design of the database system. Database design plays an important role in determining system performance. Process optimization is done in this study by using one of the functions that have been given in MySQL by using VIEW. This virtual table process to be performed by the system to be faster. This is because during the system requests to the server is does not need to query over and over because it has been done in the database management system.

**Keywords** — *MySQL; Database; Optimizing*

## I. INTRODUCTION

Information technology is currently experiencing rapid growth. One impact of the development of information technology is the need for information technology is greatly improved. One example of information technology used is the Internet. Use of the Internet is certainly a part that cannot be separated in an organization. Research institutes and dedication to the community is one of the institutions or organizations that are in the neighborhood Diponegoro University. This institution must use information technology to manage and regulate their activities.

Research, publications and community service is one activity that is managed by the Institute for Research and Community Service. The process of managing these activities today cannot be separated from the Internet therefore we need

a system that can manage every activity. To obtain the proper management it needs a system that is supported by the database system is also good.

As is known the data generated Diponegoro University lecturer in this extremely diverse. The activity data is collected and managed in a management information system. The amount of data is large enough this will cause problems in the process of accession. So the quality of the information that will be displayed will also be influential.

This paper discusses how to conduct the process of optimizing in the database system so that when the data is accessed does not affect the performance of server systems. Process optimization is done on the design of the database system. Database design plays an important role in determining system performance. Process optimization is done in this study by using one of the functions that have been given in MySQL by using VIEW.

## II. LITERATURE REVIEW

### A. Data and Information

Data is something that does not have meaning for the recipient and are still in need of a treatment. Data can be either a state , images, sounds , letters, numbers , math , language or other symbols that we can use as an ingredient to look at the environment , objects, events, or concepts. The availability of data in an information system is something that is very important. Process management and storage of data required a design that should fulfill the concept of effectiveness. Information system the data collected will be processed to obtain information. To produce quality data will require an optimum process and has a high degree of validity. Data have a high degree of validity and processed to have a something sense called with information. So with this information an organization can specify a policy or decision to be taken. Although the terms data and information are sometimes used indiscriminately, they do have different meanings. Data are non-random symbols that represent the values of attributes or

events. Hence, data are facts, events and transactions stored according to an agreed code. Data are facts obtained through reading, observation, calculation and measurement [1]. Fig. 1 depict about transformation of data into information.

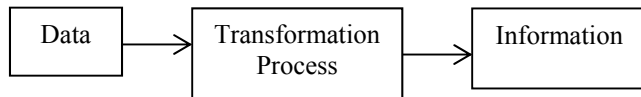


Fig. 1 Transformation of Data

Developments in information technology have an impact on the use of information systems. The information system currently uses the help of information technology to simplify management. Role of Information Technology on human activity at this time is so large [2]. Information technology has been a major facilitator for business activities, contributed greatly to fundamental changes in the structure, operation and management of the organization. Thanks to this technology, the convenience can be perceived by humans. Broadly speaking, the role of information technology:

- a. Information technology replaces human role. In this case, the information technology to automate a task or process.
- b. Technology to strengthen the role of man, by presenting information on a task or process.
- c. Information technology plays a role in the restructuring of the role of human beings. In this case, technology plays a role in making changes to a set of tasks [3].

#### B. Information System Management

Management information system, or MIS, broadly refers to a computer-based system that provides managers with the tools for organize, evaluate and efficiently manage departments within an organization. In order to provide past, present and prediction information, a management information system can include software that helps in decision making, data resources such as databases, the hardware resources of a system, decision support systems, people management and project management applications, and any computerized processes that enable the department to run efficiently. The role of the management information system (MIS) manager is to focus on the organization's information and technology systems. The MIS manager typically analyzes business problems and then designs and maintains computer applications to solve the organization's problems.

Information is an essential factor for the company in that the possession or otherwise of opportune information will be a determining factor in the quality of the decisions it adopts, and as a result, of the strategy that it might design and put into practice at any given moment Good information provides value. Experience shows that good information should present the following qualities:

1. Relevance
2. Accuracy
3. Completeness
4. Source trustworthiness

5. Communication with the right person
6. Punctuality
7. Detail
8. Comprehension

#### C. Database

This database is a collection of information stored in the computer in a systematic way so that it can be checked using a computer program to obtain information from the database. The software used to manage and call query (query) database called database management system (database management system , DBMS ) . The database is a very important aspect in information systems that the database is a repository of data to be processed further. The database is important because it can organize the data, avoid duplication of data, relationships between data that is not clear and also updates complicated .

In common parlance, the term database refers to a collection of data that is managed by a DBMS. The DBMS is expected to:

1. Allow users to create new databases and specify their logical structure of the data, using a specialized data-definition language.
2. Give users the ability to query the data and modify the data, using an appropriate language, often called a query language or data-manipulation language.
3. Support the storage of very large amounts of data in terabytes or more over a long period of time, allowing efficient access to the data for queries and database modifications.
4. Enable durability, the recovery of the database in the face of failures, errors of many kinds, or intentional misuse.
5. Control access to data from many users at once, without allowing unexpected interactions among users and without actions on the data to be performed partially but not completely [4].

MySQL is the most popular Open Source SQL database management system. MySQL databases consist of any number of tables. Tables hold the data. Tables are made up of columns and rows. A user that has been given a CREATE and DROP permissions on a database can create and remove tables of that database. The CREATE TABLE command simultaneously creates the table and defines its structure [5]. The CREATE TABLE command can either be entered at the “mysql>prompt” or can be written into a file and sent into MySQL later. The latter is preferable because you retain a record of how created the table. A table may be created as follows:

```

DROP TABLE IF EXISTS tbl_user;
CREATE TABLE tbl_user (
  username VARCHAR(20) NOT NULL,
  password VARCHAR(32) NOT NULL,
  id INT NOT NULL AUTO_INCREMENT,
);
  
```

In the example pieces of this program shows how to create a user table that will be used by the system, “tbl\_user” own field username , password and id . For this id will have a value of auto increment.

MySQL has several types of data that will be used. The data type is a form of data modeling, which was declared at the time of table creation. This type of data will affect any data to be inserted into a Table in a database. Data to be entered must match the data type is declared. These data types include: Data Types for Numbers, Data Type to Date and Time, Data Types for Character and Misc.

MySQL views are essentially a way to package up SELECT statements into re-usable virtual tables whereby the data can be retrieved simply by referencing the view, rather than having to repeat the associated SELECT statement. Views are most commonly used in conjunction with joins. Here is a snippet of code to create a view

```
CREATE VIEW dosen AS
SELECT CONCAT(UPPER(name),",
address) FROM tbl_dosen;
```

### III. METHODOLOGY

Database design on information systems research, publications and community service are as follows:

#### 1. Data collection and analysis

It is a stage where we will perform an identification and analysis of needs. To determine the needs of a database system, it is necessary to advance the introduction of other parts of the information system that will interact with the database systems. The following are the activities of data collection and analysis:

1. Determine the user groups and fields of application
2. Review the existing documentation
3. Analysis of the operating environment and data processing

#### 2. Designing a contextual database

At this stage will be generated conceptual schema for the database that depends on a specific DBMS. Database design phase conceptual design stages, there are two conceptual schemes and transaction planning.

#### 3. DBMS Selection

Database selection is determined by several factors, including factors engineering, economic and political organization. In this research database management system is used by MySQL.

#### 4. Logical database design

The next stage is to create a conceptual schema and the external schemas in the data model of the DBMS selected. This phase is done by mapping a conceptual schema and the external schemas generated in stage 2. At this stage, the conceptual schema is transformed from high-level data model that is used in step 2 into the data model of the data model of the DBMS chosen at stage 3.

#### 5. Physical database design

Physical database design is the process of selecting the storage structures and access paths to the files database for achieving the best performance in a variety of applications

#### 6. Implementation of the system database

Once the design is logically and physically complete, we can implement a database system. DDL commands in and SDL (Storage Definition Language) of DBMS is selected, collected and used to create the database schema and database files.

### IV. RESULT

Implementation and test results will be discussed in this section. Developed the first implementation is to implement functionality SIP3MU view on the database. Function view that develop among others :

#### 1. view\_penelitian

Table view is used to create a virtual table that will display the combined information some tables. Here is a snippet of code to create a table “view\_penelitian”

```
CREATE VIEW `view_penelitian` AS select
`tb_datapenelitian`.`id_penelitian` AS
`id_penelitian`,`tb_datapenelitian`.`judul` AS
`judul`,`tb_datapenelitian`.`ketua` AS
`ketua`,`tb_datapenelitian`.`nidn` AS
`nidn`,`tb_datapenelitian`.`posisi` AS
`posisi`,`tb_datapenelitian`.`skema` AS
`skemapenelitian`,`tb_datapenelitian`.`sumberdana` AS
`sumberdana`,`tb_datapenelitian`.`biayapenelitian` AS
`biayapenelitian`,`tb_datapenelitian`.`tahunpelaksanaan` AS
`tahunpelaksanaan` from
(`tb_datapenelitian` join
`tb_anggotapenelitian`) where
((`tb_anggotapenelitian`.`id_penelitian` =
`tb_datapenelitian`.`id_penelitian`) and
(`tb_anggotapenelitian`.`tahunpelaksanaan` =
`tb_datapenelitian`.`tahunpelaksanaan`));
```

The table of database used in table view is “tabel\_datapenelitian” and “tabel\_anggotapenelitian”. Fig. 2 is an implementation of code create view “view\_penelitian”

	Field	Type	Collation	Attributes	Null	Default	Extra	View
<input type="checkbox"/>	id_penelitian	int(5)			No	0		<input type="checkbox"/>
<input type="checkbox"/>	judul	text	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	ketua	varchar(100)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	nidnketua	varchar(20)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	posisiketua	varchar(20)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	skemapenelitian	varchar(100)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	sumberdana	varchar(100)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	biayapenelitian	decimal(15,2)			No	None		<input type="checkbox"/>
<input type="checkbox"/>	tahunpelaksanaan	year(4)			No	None		<input type="checkbox"/>
<input type="checkbox"/>	tahunpengajuan	year(4)			No	None		<input type="checkbox"/>
<input type="checkbox"/>	luaran	varchar(100)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	nipketua	varchar(21)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	jurusan	varchar(100)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	statuspenelitian	int(1)			No	None		<input type="checkbox"/>
<input type="checkbox"/>	id_anggota	int(5)			No	0		<input type="checkbox"/>
<input type="checkbox"/>	nama	varchar(100)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	nidn	varchar(20)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	nipanggota	varchar(21)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	posisi	varchar(20)	latin1_swedish_ci		No	None		<input type="checkbox"/>
<input type="checkbox"/>	status	int(1)			No	None		<input type="checkbox"/>

Fig. 2 Table of view\_penelitian

## 2. view\_pengabdian

Table view is used to create a virtual table that will display the combined information some tables. Here is a snippet of code to create a table “view\_pengabdian”

```
CREATE VIEW `view_pengabdian` AS
select
`tb_datapengabdian`.`id_pengabdian` AS
`id_pengabdian`,`tb_datapengabdian`.`judu
l` AS `judul`,`tb_datapengabdian`.`ketua`
AS `ketua`,`tb_datapengabdian`.`nidn` AS
`nidnketua`,`tb_datapengabdian`.`posisi`
AS
`posisiketua`,`tb_datapengabdian`.`skema`
AS
`skemapengabdian`,`tb_datapengabdian`.`
sumberdana` AS `sumberdana` from
(`tb_datapengabdian` join
`tb_anggotapengabdian`) where
((`tb_datapengabdian`.`judul` =
`tb_anggotapengabdian`.`judul`) and
(`tb_datapengabdian`.`tahunpelaksanaan`
=
`tb_anggotapengabdian`.`tahunpelaksanaa
n`));
```

The table of database used in table view is “tabel\_datapengabdian” and “tabel\_anggotapengabdian”. Fig. 3 is an implementation of code create view “view\_pengabdian”

Field	Type	Collation	Attributes	Null	Default	Extra	View
<input type="checkbox"/> id_pengabdian	int(5)			No	0		
<input type="checkbox"/> judul	text	latin1_swedish_ci		No	None		
<input type="checkbox"/> ketua	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nidnketua	varchar(20)	latin1_swedish_ci		No	None		
<input type="checkbox"/> posisiketua	varchar(20)	latin1_swedish_ci		No	None		
<input type="checkbox"/> skemapengabdian	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> sumberdana	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> biayapengabdian	decimal(10,2)			No	None		
<input type="checkbox"/> tahunpelaksanaan	year(4)			No	None		
<input type="checkbox"/> tahunpengajuan	year(4)			No	None		
<input type="checkbox"/> luaran	varchar(200)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nipketua	varchar(21)	latin1_swedish_ci		No	None		
<input type="checkbox"/> jurusan	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> statuspengabdian	int(1)			No	None		
<input type="checkbox"/> id_anggota	int(5)			No	0		
<input type="checkbox"/> nama	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nidn	varchar(20)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nipanggota	varchar(21)	latin1_swedish_ci		No	None		
<input type="checkbox"/> posisi	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> status	int(1)			No	None		

Fig. 3 Table of view\_pengabdian

## 3. view\_publikasi

Table view is used to create a virtual table that will display information publication data generated by the lecturers. This table combines the two tables of the publication of data tables and tables member publications. Here is a snippet of code in “view\_publikasi”.

```
CREATE VIEW `view_publikasi` AS select
`tb_publikasi`.`id_publikasi` AS
`id_publikasi`,`tb_publikasi`.`judul` AS
`judul`,`tb_publikasi`.`ket` AS
`ket`,`tb_publikasi`.`penulis` AS
`nama`,`tb_publikasi`.`nidn` AS
`nidn`,`tb_publikasi`.`namajurnal` AS
`jurnal`,`tb_publikasi`.`statusjurnal` AS
`statusjurnal`,`tb_publikasi`.`url` AS
`url`,`tb_publikasi` from (`tb_publikasi` join
`tb_anggotapublikasi`) where
((`tb_anggotapublikasi`.`id_publikasi` =
`tb_publikasi`.`id_publikasi`) and
(`tb_anggotapublikasi`.`tahun` =
`tb_publikasi`.`tahun`));
```

The results of the implementation the code snippet is “view\_publikasi” table used to display information from publications produced by each lecturer in a Diponegoro University. Fig. 4 shows the table view publication.

Field	Type	Collation	Attributes	Null	Default	Extra	View
<input type="checkbox"/> id_publikasi	int(5)			No	0		
<input type="checkbox"/> judul	varchar(300)	latin1_swedish_ci		No	None		
<input type="checkbox"/> ket	varchar(300)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nama	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nidn	varchar(20)	latin1_swedish_ci		No	None		
<input type="checkbox"/> jurnal	varchar(500)	latin1_swedish_ci		No	None		
<input type="checkbox"/> statusjurnal	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> url	varchar(500)	latin1_swedish_ci		No	None		
<input type="checkbox"/> tahun	year(4)			No	None		
<input type="checkbox"/> prodi	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> fakultas	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> status	int(1)			No	None		
<input type="checkbox"/> id_anggota	int(5)			No	0		
<input type="checkbox"/> namaanggota	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nidnanggota	varchar(10)	latin1_swedish_ci		No	None		
<input type="checkbox"/> prodianggota	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> fakultasanggota	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> posisi	varchar(100)	latin1_swedish_ci		No	None		
<input type="checkbox"/> statusanggota	int(1)			No	None		

Fig. 4 Tabel of view\_publikasi

Virtual table process is to be performed by the system to be faster. This is because during the system request to the server does not need to query over and over because it has been done in the database management system.

## Testing

Testing database using phpMyAdmin already installed in the servers. Fig. 5 is the result of the implementation of table “view\_penelitian”.

**Host:** localhost  
**Database:** db\_sippkm  
**Generation Time:** Aug 19, 2016 at 02:29 PM  
**Generated by:** phpMyAdmin 3.2.4 / MySQL 5.1.41  
**SQL query:** SELECT \* FROM 'view\_penelitian' LIMIT 0, 30 ;  
**Rows:** 30

	id_penelitian	judul	ketua	nidnketua	posisiKetua	skemapenelitian	sumberdana	biayapenelitian	tahunpelaksanaan	tahunpengajuan
<input type="checkbox"/>	10	Perancangan Sistem Informasi untuk Penelitian dan	Kurniawan Teguh Martono, ST, MT	0019038304	Ketua	Penelitian Pengembangan Teknologi	BOPTN	15000000.00	2015	2015
<input type="checkbox"/>	7	Rancang Bangun Media Pengenalan Rambu/Rambu LaluL.	Kurniawan Teguh Martono, ST, MT	0019038304	Ketua	Penelitian Dasar	DIPA	15000000.00	2015	2015
<input type="checkbox"/>	28	Pengembangan Model Struktural Risiko Kredit Berdas.	DI ASIH I MARUDGAN	0011077302	Ketua		PNBP UNDIP	65000000.00	2015	2015

Fig. 5 Testing table of view\_penelitian

Results are shown in table “view\_penelitian” is a joint of several tables. With the table “view\_penelitian” This will speed query results requested by the information system this is due to join the process and the query is already done by the MySQL database engine. Application at the time of data request will immediately display without having to process the query.

Further testing is testing “view\_publikasi” table. Fig. 6 depict the test results table “view\_publikasi”

Showing rows 0 - ... (Query took 0.0236 sec)

SELECT \* FROM 'view\_publikasi' LIMIT 0, 30

	id_publikasi	judul	ket	nama	nidn	jurnal	statusjurnal	url	tahun
<input type="checkbox"/>	7	Implementation of Android-Based Mobile Learning Ap...	11/5/2014	Kurniawan Teguh Martono, ST, MT	0019038304	International Journal of Computer Science Issues	Jurnal Internasional	http://ijcsi.org/papers/IJCSI-11-3-1-168-174.pdf	2014
<input type="checkbox"/>	33	Solid Waste Management in Bangkok at 2011 Thailand.	Vol.8 No.3, 2013	Hirofumi Nakayama		Journal of Disaster Research	Jurnal Internasional Bereputasi	https://www.kjppress.jp/jidrid/	2013
<input type="checkbox"/>	33	Solid Waste Management in Bangkok at 2011 Thailand.	Vol.8 No.3, 2013	Hirofumi Nakayama		Journal of Disaster Research	Jurnal Internasional Bereputasi	https://www.kjppress.jp/jidrid/	2013
<input type="checkbox"/>	33	Solid Waste Management in Bangkok at 2011 Thailand.	Vol.8 No.3, 2013	Hirofumi Nakayama		Journal of Disaster Research	Jurnal Internasional Bereputasi	https://www.kjppress.jp/jidrid/	2013

Fig. 6 Result testing for table of view\_publikasi

## V. CONCLUSION

The conclusions obtained from this study are as follows:

1. Optimizing the query process is needed in an information system with a large enough data
2. The virtual table is implemented in MySQL is very helpful in the process of query

Suggestions in this study are :

1. Required data replication process so that when the database management system crash will not cause a system failure
2. Required development with High Availability system for the system to be accessed with zero downtime.

## References

- [1] Alcamí R L, Carañana C D. 2012. Introduction to Management Information Systems. Primera edición
- [2] Sangrà A, Sanmamed M G. 2010. The role of information and communication technologies in improving teaching and learning processes in primary and secondary schools. ALT-J, Research in Learning Technology Vol. 18, No. 3 pp: 207-220
- [3] Khattak W A, Nasir M, Sultan K. 2012. The Role of Information Technology in Media Industry . International Journal of Business and Social Science Vol. 3 No. 6
- [4] Molina H G, Ullman J D, Widom J. 2009. DATABASE SYSTEMS The Complete Book 2<sup>nd</sup> Edition. Pearson Education Inc
- [5] [http://www.gen.tcd.ie/molevol/pdfs/mysql\\_tut.pdf](http://www.gen.tcd.ie/molevol/pdfs/mysql_tut.pdf) accessed 6 august 2016 10.00