

# Development of a Computer Network Monitoring Information System and Management of Meteorological Equipment at the Meteorology, Climatology and Geophysics Agency using Router OS

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## Abstract:

Meteorological Climatological and Geophysics Agency (BMKG) requires fast and accurate information about the computer network and meteorological equipment. It has to support the implementation of its main tasks. The large number of equipment, the limited technician personnel, the location between the separate equipment and the fast response time are the problems faced by BMKG technicians in Padang. Information Systems that owned by BMKG Padang currently has not used the database and only displays the status of up or down equipment only. The development of the information system becomes needed when BMKG Padang wants to improve its performance. This research is a solution to solve the above problems. The research methodology that used in the development of this information system is System Development Life Cycle (SDLC) with 4 (four) main stages: Planning, Analysis, Design and Implementation. Development of this information system using php programming language and database design using MySQL. The result of this information system development shows that this new application is better because data storage is using database so it is more secure, search data archive faster and avoid data duplication.

**Key Word:** Computer Network; Monitoring; Meteorological Equipment

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## I. Introduction

The Meteorology, Climatology and Geophysics Agency (BMKG) Padang is a Technical Implementation Unit (UPT) within the Meteorology, Climatology and Geophysics Agency, which is under and responsible to the Head of the Meteorology, Climatology and Geophysics Agency. BMKG Padang has a lot of meteorological equipment along with computer networks and communication networks such as weather radar, Automated Weather Observing System (AWOS), Synergie and Aerometweb, Computerized Message Switching System (CMSS) and the Internet as well as various conventional weather observation equipment. All the equipment is required to always function and be properly connected. The large number of equipment, the limited number of technician personnel, the location between separate equipment and the fast response time are the problems faced by BMKG Padang technicians. BMKG Padang currently only has an Integrated Equipment Communication Network Monitoring Information System Using the Mikrotik Router OS without a database to monitor the equipment mentioned above. Monitoring of these equipments currently only shows up or down status. BMKG Padang manages meteorological equipment manually in the midst of the demand for reliable meteorological equipment, where the meteorological equipment management at BMKG Padang currently goes through several procedures between work units and produces several report documents that are made with Microsoft Office. Over time, the number of reports has increased in number, so it takes a relatively long time to find the data to be used as evaluation material.

Mikrotik Router OS is an operating system and software that can be used to turn ordinary computers into reliable network routers. According to Madcoms Research and Development (2016: 11) that "Mikrotik router OS is a product from Mikrotik that functions as an operating system that turns the computer into a router". Based on the opinions of the experts above, it can be concluded that the Mikrotik router OS is an operating system software that functions as a router. One of the tools that Mikrotik router OS has is netwatch. Netwatch monitors the condition of hosts on a computer network by sending ICMP pings to a list of specific IP addresses. Properties owned by netwatch are

- (1) Down script: command that is executed when the host is off;
- (2) Host: IP monitored;
- (3) Interval: ping interval;

- (4) Time Out: timeout to consider the host off; and
- (5) Up Script: command that is executed when the host condition is on.

Based on these problems, the objectives of this study were

- (1) fulfilling the requirements for completing the undergraduate study at STMIK Indonesia Padang;
- (2) Assist BMKG Padang in monitoring computer networks and managing meteorological equipment, storing data, searching for data and developing more accurate information systems; and
- (3) Building a "Computer Network Monitoring Information System and Meteorological Equipment Management at the Meteorology, Climatology and Geophysics Agency (BMKG) Padang using Mikrotik Router OS". The benefit of this research is that BMKG Padang is easy in monitoring computer networks and managing meteorological equipment, storing data, searching for data, and having a better information system than before.

## **II. Material and Methods**

The research methodology that the authors do is as follows:

### **1. Field Research**

Field research was carried out at BMKG Padang, Padang Minangkabau International Airport by, among others:  
a. Observation Conduct direct observations at BMKG Padang on how the existing information system works and collect the data needed for the development of the information system.  
b. Interview Doing questions and answers with the leadership, admin and operator staff at BMKG Padang regarding the information system that is currently running and what kind of information system development is desired.  
c. Questionnaire Make a questionnaire to the leadership, admin and operator staff at BMKG Padang regarding the information system that is currently running and what kind of information system development is wanted to deepen the existing information system development plan and so that the author has documentation about this.

### **2. Library Research**

Research is carried out in all libraries that the authors can access both campus libraries, online libraries and BMKG Padang libraries to obtain the data needed for the development of information systems, in the form of books, articles, journals and regulations regarding BMKG Padang.

### **3. Laboratory Research**

The research was conducted on the author's laptop with the aim of testing the information system development design as needed and can be applied later.

**4. System Development Life Cycle (SDLC)** In this study, the authors conducted 4 (four) main stages in implementing SDLC, namely:

#### **a. Planning**

The author plans the development of this information system by developing research management plans and other planning documents with the aim of obtaining a new, better information system. One of the plans in this research is to determine the output report and optimal database use.

#### **b. Analysis**

The author identifies and understands the problems in the existing information system at BMKG Padang. The author pays attention to the needs of the user (users) and creates a functional requirements document. Some of the things done are analyzing (analyze) the flow of information systems that are already running and making suggestions for new information system flows and proposals for solving problems encountered in the old information system. At the end, the writer makes a report on the analysis results (report).

#### **c. Design**

The author translates the analysis results into a global design and detailed design. Global design is carried out using information system design tools such as HIPO, DFD and ERD. Detailed design is done by compiling an IPO (input-process-output) design, database file design, technology design and control design.

#### **d. Implementation**

At this stage the author begins to create input, process, output forms that have been designed using the PHP programming language, create coding programs, carry out program testing and submit the program to BMKG Padang to be applied to support the implementation of its main tasks.

### Analysis

Comparison of the results of the ongoing system analysis with the proposed system is necessary to facilitate the development of this information system. Table 1 below shows a comparison of the results of the analysis where the table shows that the proposed system will solve problems in the current system.

**Table no 1 :Comparison of Current and Proposed System**

No	Current System	Proposed System
1	Computer network monitoring and equipment management have not used a database	Computer network monitoring and equipment management using a database.
2	Meteorological equipment management is still done manually.	Meteorological equipment management is computerized.
3	Data storage for computer network monitoring and equipment management still uses paper archives.	Storage of computer network monitoring data and management of equipment in the database so that it is safer.
4	The search for data archives for computer network monitoring and management of meteorological equipment takes a relatively long time	Faster search of computer network monitoring data archives and management of meteorological equipment.
5	Filing is more expensive and less secure	Archiving is much safer and cheaper by using a database.

### III. Results

#### 1. System Implementation

Implementation is the next stage after the analysis and system design has been carried out. At this stage the system is applied and tested to ensure that the system can be operated or used. The following is the implementation of the Development of a Computer Network Monitoring Information System and Meteorological Equipment Management at the Meteorology, Climatology and Geophysics Agency (BMKG) Padang using the Mikrotik Router OS, which consists of selecting hardware (hardware) and software (software) and selecting personnel.

##### a. Hardware

- 1) Intel Pentium CPU P6200 @ 2.13 GHz
- 2) 3 GHz RAM
- 3) 500 GB hard drive
- 4) VGA Intel HD Graphics
- 5) HP LaserJet 1120 printer
- 6) Mikrotik CCR1009-7G-1C-1S +
- 7) Modem

##### b. Software:

- 1) Windows 7 Ultimate 32-bit
- 2) PHP 5.4.7
- 3) MySQL 5.5.27
- 4) Macromedia Dreamweaver 8
- 5) SQLyog v11.11 (32 bit)
- 6) Google Chrome Version 57.12.2987.98
- 7) Microsoft Office Visio 2007

##### c. Brainware

###### 1) Admin

- i. Coordinator of BMKG Padang technicians
- ii. Person in charge of IT BMKG Padang

###### 2) Leadership

- i. Head of the Minangkabau Meteorological Station (BMKG), Padang
- ii. Head of the Observation and Information Section of the BMKG Padang
- iii. Head of Sub Division of Administration BMKG Padang

###### 3) Operators

- i. Padang BMKG technician
- ii. BMKG Padang Operational Officer
- iii. Administrative Officer of BMKG Padang

**Implementation**

The equipment inventory report is information about the equipment table as well as information about the equipment owned by BMKG. Figure 1 below shows a display of the equipment inventory report.

No	Nama	Merk	Tipe	No Seri	Indikasi	Uraian	Foto	Tanggal Rusak
1	Thermometer Minimum	Thermo Schneider	Air Raksa	4430	tidak terbaca	angka tak terlihat		2018-01-05 00:16:51
2	Barometer Digital	Vaisala	PTB 330	G.055000.3	nilai qnh mencurigakan	selisih terlalu besar		2018-01-05 10:33:33

**Figure 1.** Equipment inventory report

NOMOR	NAMA ALAT	MERK	TIPE	NOMOR SERI	TAHUN PENGADAN	JUMLAH DIPAKAI DIOPERASIKAN	KONDISI B/S/R	KALIBRASI TERAKHIR	NOMOR SERTIFIKAT	KETERANGAN
1	Thermometer Bola Kering	Thermo Schneider	Air Raksa	3232	2007	2007	Baik	2007-05-03	Sert FC-TT/022-F/W/BMKG/2017	Taman Alat BIK
2	Thermometer Bola Basah	Thermo Schneider	Air Raksa	4608	2008	2008	Baik	2007-05-03	Sert FC-TT/022-G/W/BMKG/2017	Taman Alat BIK
3	Thermometer Maksimum	Thermo Schneider	Air Raksa	3432	2008	2008	Baik	2007-05-03	Sert FC-TT/022-L/W/BMKG/2017	Taman Alat BIK

**Figure 2.** Operational equipment inventory

**IV. Discussion**

Discussion on System Implementation. The web application display "Development of Computer Network Monitoring Information System and Meteorological Equipment Management at the Meteorology, Climatology and Geophysics Agency (BMKG) Padang Using Mikrotik Router OS" is the part that will be discussed next. The appearance of this application is in the form of several forms which are an intermediary medium for the interaction between the user and this application. The form of implementation is as follows:

a. Output

1) Equipment Inventory Report The equipment inventory report is information about the equipment table as well as information about the equipment owned by BMKG Padang. Figure 8 below shows a display of the equipment inventory report.

Implementation of the next stage after the analysis and system design that has been carried out. At this stage it is applied and tested that the system can be operated or used. The following is the implementation of the Implementation of Computer Network Monitoring Information System Development and Meteorological Equipment Management at the Meteorology, Climatology and Geophysics Agency (BMKG) Padang using Mikrotik Router OS, which consists of hardware and software selection activities as well as personnel selection.

**V. Conclusion**

Taking into account the results of research conducted on "Development of Computer Network Monitoring Information Systems and Meteorological Equipment Management at the Meteorology, Climatology and Geophysics Agency (BMKG) Padang using Router OS", it can be concluded that the development of this information system succeeded in making:

1. A new information system that not only displays the up and down status of the equipment but also stores the status in a database.
2. A new information system that manages computerized BMKG Padang meteorological equipment.
3. A new information system that stores the results of computer network monitoring and management of meteorological equipment into a database.
4. A new information system that makes searching for data on computer network monitoring and management of meteorological equipment faster.
5. A new information system that assists BMKG Padang in developing a more accurate information system.

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