Implementation of SMES Address Information Data Processing Database Design Using Python Programming

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Abstract

This study aims to implement a database using Flask framework in Python programming language. The database management system used was MySQL. The database contained data about SME addresses. There were 5 interrelated tables that were the table of UKM, the table of alamat_UKM, the table of kelurahan, the table of kecamatan, and the table of kabupaten. The researchers applied the waterfall model. This model was carried out by taking a sequential approach in software development. The steps in this model were system and software requirements, analysis, design, coding, testing, and maintenance. This study resulted in 2 applications that were the Python-based application which was a server-side program and the website-based application which was a client-side program. In developing the applications, all processes in the database management system consisting of CRUDs (Create, Read, Update, Delete and Search) were developed, implemented, and processed in accordance with the transactional process in database management..

Keyword : SMES; Flask Framework; database; python

1. Introduction

Small Medium Enterprises (SMEs) contribute substantially to the economic growth of a country. SMEs create jobs and reduce the unemployment rate, so SMEs grow the local economy. SMEs have a role in national economic development. SMEs also have a role in economic growth and employment. Moreover, SMEs have a role in equitable infrastructure development. The government and the society have to support the development of SMEs so that there will be a more competitive SME environment (Abduh 2017).

To support the development of SMEs, it is not only by providing capital but also by providing access to information technology. Information technology supports SMEs in data management and products/services promotion. Some local governments and community organizations support SMEs in developing an information system. There are some studies on information technology in SMEs. First, the study conducted by Deny (Hardiyanto et al. 2020) developed an information system for SMEs. The information system enables people to know the location of the SME building they want to go and the route to get there with Google Maps. Moreover, this information system can display product information. Second, the study conducted by Widodo (Widodo & Imam 2016) developed an agricultural website as a communication and promotion media for farmers who were members of the Hidayah Farmer Group. This website was developed using

PHP programming language and MySQL database management system. Other studies are (Fauzi et al. 2018), (Mokhtar 2015), (Is-haq 2019), (Gutierrez-Leefmans Catalina Nava-Rogel & Andrea 2016).

Another way to support SMEs in using information technology is by conducting training in using social media to promote products of SMEs. Sholeh (Sholeh et al. 2020) conducted a mentoring program for Community Information Group that was attended mostly by SME actors in Bantul. This mentoring aimed to encourage SME actors in using social media to promote their products/services and in using the internet to do promotion and transactions. Other mentoring programs were also conducted by (Febriyantoro & Arisandi 2018),(Hanief et al. 2020), (Permatasari et al. 2020), (Hakim 2019).

The development process of an information system must consider the usefulness and the programming language. A programming language and a database management system in developing an information system are two important things that must be decided at the initial process. A database in developing an information system is very important because all data must be stored in a database. The database design process must be able to avoid deviation. Deviation that must be avoided in database design is such as deviation in deleting data, changing data, and in adding data. (Indrajani 2018),(Henderi), (Carlos Coronel 2017),(S. Sumathi 2007)

The development of the website to publish SME information in this study used a programming language, Python and a database management system, MySQL. The programming language Python is not only used for big data application and computer vision application development but also used for database management. The advantages of using Python in programming are more features and less programming code. Database management with Python, both desktop and web-based, can use a library that supports the database such as PyMySQL library. PyMySQL library is used for database management using MySQL database management system and Flask library is a framework that can be used to display the results of website-based database management. (Raharjo 2017),(Bhasin 2019),(Pirnat 2015),(Patil 2019)

The study of Patil [20] investigated the use of Flask framework in Python. Python can be used in database management. Python has supports for database management via API (application programming interface). The modules included in Python are SQLite and Berkeley DB modules. Other modules that can be used in database management in Python are MySQL, PostgreSQL and others. These modules are available as third party modules and the process of using the database must be installed before use. Mandeep (Singh et al. 2019) in his study developed a college database management system using Python Flask framework. The Python Flask framework was used to implement the application and the application can be accessed via the website. Other studies that used a database with python are (Halachev 2020), (Susanti & Mailoa 2020), (Ramdani & Firmansyah 2018).

Based on the literature study, this research will develop an application that uses the flask framework in Python and database management using the Mysql DBMS. This study explained the process of developing a website using Python from creating the database and tables to managing CRUDs (create, read, update, delete and search) in MySQL database management system. There are 2 developed applications that are the Python-based application for data processing and the website-based application that are used to view the results of data processing carried out in Python.

2. Research Method

The researchers conducted several steps that were system and software requirements, analysis, design, coding, testing, and maintenance. The researchers used Python 3.7, HTML, MySQL, Apache, and the browser. The libraries used were PyMySQL and Flask. There are 2 developed applications that are the Python-based application for data processing and the website-based application that are used to display the results of data processing carried out in Python

3. Results and Discussion

Python programming language is not only used to develop big data applications but also used for computer vision applications and database management. The advantages of using Python are many features, less programming code, and library support. In managing this database, the researchers used PyMySQL library and Flask library. PyMySQL library is used for the MySQL database management system and Flask library is a framework used to display the results of website-based database processing. The library installation process was carried out by giving the pip install command for the library name. If in the Python folder there were already a library to be installed, the system would give a message that the library already existed. Moreover, if not, the researchers would do the installation process. The Fig 1 presents the PyMySQL library installation process. Because the library was not on the system, the installation process was carried out.

Fig 1. The PyMySQL library installation process

Another library needed in this study is Flask framework. Flask framework is used to display the results of data processing carried out in Python on the website, so that users can run the application via a browser (Grinberg 2018), (Copperwaite & Leifer 2015) . The library installation process was carried out by giving the pip install Flask command. Fig 2. is the Flask library installation process and a message conveys that the Flask library already exists on the system.

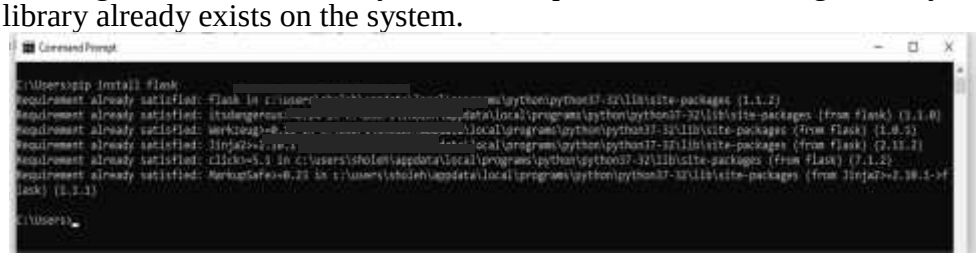

Fig 2. The Flask library installation process

To test the success of the installation process, the researchers gave the import command in Python which is presented in the Fig 3. In the Fig 3, there is no error message which means that the system has installed the PyMySQL and Flask library.

Fig 3. Testing PyMySQL and Flask library in Python

1.1. Creating Database

The implementation of Python as the programming language began with creating the SME database. The SQL command used to create the SME database was 'CREATE DATABASE ukm'. The Python script to create the database is in the Table 1 and the program results are in the Fig 4.

Table 1. The Python script to create the SME database

Program	Information
import pymysql	Using the PyMySQL library
con = pymysql.connect(host="localhost", user="root", passwd="")	Connecting to MySQL database management system with the host name localhost, user root, and password. The results of this connection were stored in the con object
c=con.cursor()	Defining the cursor on the con object and storing it with the variable name c where this c variable would be used to execute the query
c.execute('CREATE DATABASE ukm')	The variable c executed the query which created the SME database.
print('Database berhasil dibuat')	

Fig. 4. The results of creating a database in Python

1.2. Creating Tables

There are 5 tables that were the UKM table used to store data of SMEs, the alamat_UKM table used to store the SME addresses, the kelurahan table used to store kelurahan data, the kecamatan table used to store sub-district data, and the kabupaten table used to store district data. The script used in the process of making the UKM table is in the table 2 and the program results are in the Fig 5.

Table 2. The Python script to create the UKM table in Python

Program	Information
import pymysql	Using the pymysql library
con = pymysql.connect(host="localhost", user="root", passwd="", database="ukm")	Connecting to MySQL database management system with the host name localhost, user root, and password "". The results of this connection were stored in the con object
c = con.cursor()	Defining the cursor on the con object and storing it with the variable name c where this c variable would be used to execute the query
sql = '''CREATE TABLE ukm1 (ukm_id VARCHAR(3) PRIMARY KEY, nama_ukm VARCHAR(50), alamat_ukm VARCHAR(50), deskripsi TEXT, id_kelurahan VARCHAR(3)) '''	The SQL variable stored the query used to create the SME table with the data structure ukm> id, nama_ukm ,ukm_address, description and id_kelurahan
c.execute(sql)	The variable c executed the SQL variable containing the query that would create the table.
print("Tabel UKM berhasil dibuat!")	

Fig. 5. The results of creating tables di Python

1.3. Flask implementation

The transactional process in the database management system consists of CRUDs (Create, Read, Update, Delete and Search). The CRUDs process and the connection to MySQL were processed in Python using the PyMySQL library. The results of data processing were displayed in the browser. In using Flask, Flask architecture can be implemented by creating applications without models and templates, applications with models, applications with templates, and applications with models and templates of several possibilities, (Raharjo 2017). Flask architecture management was divided into some folders. Python coding was stored in the aplikasi_ukm folder and HTML coding was stored in a sub folder in the aplikasi_ukm folder that is the template sub folder. The folder structure used is presented below.

```
d:/aplikasi_ukm
    |
    |-- templates
    |      |--index.html
    |      |--cari_ukm.html
    |      |--edit_ukm.html
    |      |--……....
    |
    |-- ukm.py
```

Table 3. The script of ukm.py

Program	Information
from flask import Flask, render_template, request, redirect, url_for	Importing the Flask library
import pymysql	Importing the PyMySQL library
application = Flask(__name__)	Creates a Flask object
con = pymysql.connect(host='localhost',user='root',password='',db='ukm')	Connecting to MySQL database management system with the host name localhost, user root, and password "". The results of this connection were stored in the con object
c = con.cursor()	Defining the cursor on the con object and storing it with the variable name c where this c variable would be used to execute the query
@application.route('/')	Flask used route () to map functions with specific URLs. Route ('/') functioned to call index.html file.
def index():	The start of the index function
c.execute('SELECT u.ukm_id,u.nama_ukm,u.deskripsi,u.alamat_ukm,k.nama_kelurahan FROM ukm as u,kelurahan as k where	The variable c executed the SQL variable containing the query that would create the table.

u.id_kelurahan=k.id_kelurahan')	
data = c.fetchall()	Holding the data as the result of the query process
container = []	
return render_template('index.html', container=data**)**	Displaying data to index.html
……..	
if __name__ == '__main__':	
application.run(debug=True)	

The trial run of the script in table 3 was executed through the command prompt (cmd). The process of running the script in python only performed the process of processing SME data and the results of the data processing were viewed through the browser.

```
D:\ aplikasi_ukm >python utama1.py
 * Serving Flask app "utama1" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 284-178-748
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

The results of the data processing were executed through the browser with the command localhost: 5000. This command would call index.html in the template folder. The index.html script is in the Table 4.

Table 4. The script index.html

Program	Information
<tbody>	
{% for baris in container %}	The beginning to run Python commands and looping data as much as the processed data
<tr>	
<td>{{ baris[1] }}</td>	Displaying the SME data
<td>{{ baris[2] }}</td>	
<td>{{ baris[3] }}</td>	
<td>{{ baris[4] }}</td>	
</tr>	

{% endfor %}	The end to run Python commands

4. Conclusion

Flask framework supports Python programming language and they can be used in web-based programming. With Flask, Python application can be used from the server side and from the user side, and it can be run using a browser. In this study, the Flask framework can be used to process data on SMEs. SME data is stored in MySQL database management system and the programming process in Python uses the PyMySQL library. The application developed can be used to process CRUDs data, all programs related to CRUDs are built using the Python language and the results of the CRUDs process are viewed using a browser.

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