**DUAL ACCESS CONTROL FOR CLOUD-BASED DATA STORAGE AND SHARING**

**PROBLEM STATEMENT**

The main aim of this project is to provide privacy or security for uploaded data. Dual access for data owners by data owner permission.

**ABSTRACT:**

Cloud-based data storage service has drawn increasing interests from both academic and industry in the recent years due to its efﬁcient and low cost management. Since it provides services in an open network, it is urgent for service providers to make use of secure data storage and sharing mechanism to ensure data conﬁdentiality and service user privacy. To protect sensitive data from being compromised, the most widely used method is encryption. However, simply encrypting data (e.g., via AES) cannot fully address the practical need of data management. Besides, an effective access control over download request also needs to be considered so that Economic Denial of Sustainability (EDoS) attacks cannot be launched to hinder users from enjoying service. In this paper, we consider the dual access control, in the context of cloud-based storage, in the sense that we design a control mechanism over both data access and download request without loss of security and efﬁciency. Two dual access control systems are designed in this paper, where each of them is for a distinct designed setting. The security and experimental analysis for the systems are also presented

**KEYWORDS**: Searchable Encryption, Multi-Keyword Search, Multi-User Access, Search Pattern, Access Pattern.

**INTRODUCTION**

IN the recent decades, cloud-based storage service has attracted considerable attention from both academia and industries. It may be widely used in many Internet-based commercial applications (e.g., Apple iCould) due to its long-list beneﬁts including access ﬂexibility and free of local data management. Increasing number of individuals and companies nowadays prefer to outsource their data to remote cloud in such a way that they may reduce the cost of upgrading their local data management facilities/devices.

However, the worry of security breach over outsourced data may be one of the main obstacles hindering Internet users from widely using cloud-based storage service. In many practical applications, outsourced data may need to be further shared with others. For example, a Dropbox user Alice may share photos with her friends. Without using data encryption, prior to sharing the photos, Alice needs to generate a sharing link and further share the link with friends. Although guaranteeing some level of access control over unauthorized users (e.g., those are not Alice’s friends), the sharing link may be visible within the Dropbox administration level (e.g., administrator could reach the link). Since the cloud (which is deployed in an open network) is not be fully trusted, it is generally recommended to encrypt the data prior to being uploaded to the cloud to ensure data security and privacy. One of the corresponding solutions is to directly employ an encryption technique(e.g., AES) on the outsourced data before uploading to cloud, so that only speciﬁed cloud user (with valid decryption key) can gain access to the data via valid decryption. To prevent shared photos being accessed by the “insiders” of the system, a straightforward way is to designate the group of authorized data users prior to encrypting the data. In some cases, nonetheless, Alice may have no idea about who the photo receivers/users are going to be. It is possible that Alice only has knowledge of attributes w.r.t. photo receivers. In this case, traditional public key encryption (e.g., Paillier Encryption), which requires the encryptor to know who the data receiver is in advance, cannot be leveraged. Providing policy-based encryption mechanism over the outsourced photos is therefore desirable, so that Alice makes use of the mechanism to deﬁne access policy over the encrypted photos to guarantee only a group of authorized users is able to access the photos. In a cloud-based storage service, there exists a common attack that is well-known as resource-exhaustion attack. Since a (public) cloud may not have any control over download request(namely, a service user may send unlimited numbers of download request to cloud server), a malicious service user may launch the denial-of-service (DoS)/distributed denial-of-service (DDoS) attacks to consume the resource of cloud storage service server so that the cloud service could not be able to respond honest users’ service requests. As a result, in the “pay-as-you-go” model, economic aspects could be disrupted due to higher resource usage. The costs of cloud service users will rise dramatically as the attacks

In this paper, we propose a new mechanism, dubbed dual access control, to tackle the above aforementioned two problems. To secure data in cloud-based storage service, attribute-based encryption (ABE) [9] is one of the promising candidates that enables the conﬁdentiality of out sourced data as well as ﬁne-grained control over the outsourced data. In particular, Ciphertext-Policy ABE (CP-ABE) [5] provides an effective way of data encryption such that access policies, deﬁning the access privilege of potential data receivers, can be speciﬁed over encrypted data. Note that we consider the use of CP-ABE in our mechanism in this paper. Nevertheless, simply employing CP-ABE technique is not sufﬁcient to design an elegant mechanism guaranteeing the control of both data access and download request.

**LITERATURE SURVEY**

**[1] Alexandros Bakas and Antonis Michalas. Modern family: A revocable hybrid encryption scheme based on attribute-based encryption, symmetric searchable encryption and SGX. In SecureComm 2019, pages 472–486, 2019.**

Secure cloud storage is considered as one of the most important issues that both businesses and end-users take into account before moving their private data to the cloud. Lately, we have seen some interesting approaches that are based either on the promising concept of Symmetric Searchable Encryption (SSE) or on the well-studied field of Attribute-Based Encryption (ABE). In this paper, we propose a hybrid encryption scheme that combines both SSE and ABE by utilizing the advantages of both these techniques. In contrast to many approaches, we design a revocation mechanism that is completely separated from the ABE scheme and solely based on the functionality offered by SGX

**[2] Antonis Michalas. The lord of the shares: combining attributebased encryption and searchable encryption for ﬂexible data sharing. In SAC 2019, pages 146–155, 2019**

Secure cloud storage is considered one of the most important issues that both businesses and end-users are considering before moving their private data to the cloud. Lately, we have seen some interesting approaches that are based either on the promising concept of Symmetric Searchable Encryption (SSE) or on the well-studied field of Attribute-Based Encryption (ABE). In the first case, researchers are trying to design protocols where users' data will be protected from both *internal* and *external* attacks without paying the necessary attention to the problem of user revocation. On the other hand, in the second case existing approaches address the problem of revocation. However, the overall efficiency of these systems is compromised since the proposed protocols are solely based on ABE schemes and the size of the produced ciphertexts and the time required to decrypt grows with the complexity of the access formula. In this paper, we propose a protocol that combines *both* SSE and ABE in a way that the main advantages of each scheme are used. The proposed protocol allows users to directly search over encrypted data by using an SSE scheme while the corresponding symmetric key that is needed for the decryption is protected via a Ciphertext-Policy Attribute-Based Encryption scheme.

**[3] G. Wang, C. Liu, Y. Dong, P. Han, H. Pan, and B. Fang, “Idcrypt: A multi-user searchable symmetric encryption scheme for cloud applications,” IEEE Access, vol. 6, pp. 2908–2921, 2018.**

Searchable Encryption (SE) has been extensively examined by both academic and industry researchers. While many academic SE schemes show provable security, they usually expose some query information (e.g., search and access patterns) to achieve high efficiency. However, several inference attacks have exploited such leakage, e.g., a query recovery attack can convert opaque query trapdoors to their corresponding keywords based on some prior knowledge. On the other hand, many proposed SE schemes require significant modification of existing applications, which makes them less practical, weak in usability, and difficult to deploy. In this paper, we introduce a secure and practical searchable symmetric encryption scheme with provable security strength for cloud applications, called IDCrypt, which improves the search efficiency, and enhances the security strength of SE using symmetric cryptography. We further point out the main challenges in securely searching on multiple indexes and sharing encrypted data between multiple users. To address the above issues, we propose a token-adjustment search scheme to preserve the search functionality among multi-indexes, and a key sharing scheme which combines identity-based encryption and public-key encryption. Our experimental results show that the overhead of the key sharing scheme is fairly low.

**[4] Kaiping Xue, Weikeng Chen, Wei Li, Jianan Hong, and Peilin Hong. Combining data owner-side and cloud-side access control for encrypted cloud storage. IEEE Transactions on Information Forensics and Security, 2018.**

People endorse the great power of cloud computing, but cannot fully trust the cloud providers to host privacy-sensitive data, due to the absence of user-to-cloud controllability. To ensure confidentiality, data owners outsource encrypted data instead of plaintexts. To share the encrypted files with other users, ciphertext-policy attribute-based encryption (CP-ABE) can be utilized to conduct fine-grained and owner-centric access control. But this does not sufficiently become secure against other attacks. Many previous schemes did not grant the cloud provider the capability to verify whether a downloader can decrypt. Therefore, these files should be available to everyone accessible to the cloud storage. A malicious attacker can download thousands of files to launch economic denial of sustainability (EDoS) attacks, which will largely consume the cloud resource. The payer of the cloud service bears the expense. Besides, the cloud provider serves both as the accountant and the payee of resource consumption fee, lacking the transparency to data owners. These concerns should be resolved in real-world public cloud storage. In this paper, we propose a solution to secure encrypted cloud storages from EDoS attacks and provide resource consumption accountability. It uses CP-ABE schemes in a black-box manner and complies with arbitrary access policy of the CP-ABE. We present two protocols for different settings, followed by performance and security analysis

**[5] Jianting Ning, Zhenfu Cao, Xiaolei Dong, Kaitai Liang, Hui Ma, and Lifei Wei. Auditable σ-time outsourced attribute-based encryption for access control in cloud computing. IEEE Transactions on Information Forensics and Security, 13(1):94–105, 2018..**

As a sophisticated mechanism for secure finegrained access control over encrypted data, ciphertext-policy attribute-based encryption (CP-ABE) is one of the highly promising candidates for cloud computing applications. However, there exist two main long-lasting open problems of CP-ABE that may limit its wide deployment in commercial applications. One is that decryption yields expensive pairing cost which often grows with the increase of access policy size. The other is that one is granted access privilege for unlimited times as long as his attribute set satisfies the access policy of a given ciphertext. Such powerful access rights, which are provided by CP-ABE, may be undesirable in real-world applications (e.g., pay-as-youuse). To address the above drawbacks, in this paper, we propose a new notion called auditable σ-time outsourced CF-ABE, which is believed to be applicable to cloud computing. In our notion, expensive pairing operation incurred by decryption is offloaded to cloud and meanwhile, the correctness of the operation can be audited efficiently. Moreover, the notion provides σ-time fine-grained access control. The cloud service provider may limit a particular set of users to enjoy access privilege for at most σ times within a specified period. As of independent interest, the notion also captures key-leakage resistance. The leakage of a user's decryption key does not help a malicious third party in decrypting the ciphertexts belonging to the user. We design a concrete construction (satisfying our notion) in the key encapsulation mechanism setting based on Rouselakis and Waters (prime order) CP-ABE, and further present security and extensive experimental analysis to highlight the scalability and efficiency of our construction

**EXISTING SYSTEM:**

The existing works, by using normal servers for storing and sharing data that causes un security lack of privacy. There is a chance of stole our data this is the main drawback of existing system to overcome this difficulty we can go for proposed system.

**DISADVANTAGES:**

* Searching the stored documents takes time linear in the size of the database
* It uses heavy arithmetic operations
* Less security.

**PROPOSED SYSTEM:**

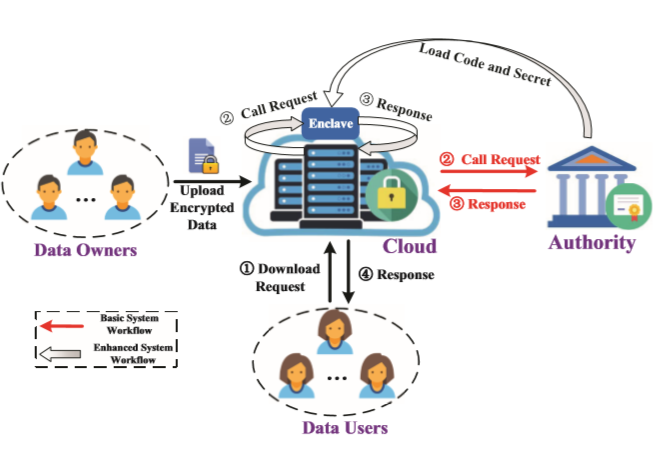
**PROPOSED SYSTEM:**

In proposed system, we propose a new mechanism, dubbed dual access control, to tackle the above aforementioned two problems. To secure data in cloud-based storage service, attribute-based encryption is one of the promising candidates that enables the conﬁdentiality of out sourced data as well as ﬁne-grained control over the outsourced data

**ADVANTAGES:**

* Provides more security.
* It uses simple arithmetic operations.
* Storage capacity is high.

**BLOCK DIAGRAM:**



**SYSTEM SPECIFICATIONS:**

# **H/W CONFIGURATION:**

# **Processor - I3/Intel Processor**

1. Hard Disk -160GB
2. Key Board - Standard Windows Keyboard
3. Mouse - Two or Three Button Mouse
4. Monitor - SVGA

**S/W CONFIGURATION:**

* Operating System : Windows 7/8/10
* IDE : Pycharm
* Server side scripts : HTML, CSS, Js
* Libraries Used : Pandas, smtplib, Flask
* Technology : Python 3.6+

**SOFTWARE INSTALLATION FOR MACHINE LEARNING PROJECTS:**

Installing Python:

To download and install Python visit the official website of Python <https://www.python.org/downloads/> and choose your version.



Once the download is complete, run the exe for install Python. Now click on Install Now.

 You can see Python installing at this point.

When it finishes, you can see a screen that says the Setup was successful. Now click on "Close".

Installing PyCharm:

To download PyCharm visit the website <https://www.jetbrains.com/pycharm/download/> and Click the "DOWNLOAD" link under the Community Section.



Once the download is complete, run the exe for install PyCharm. The setup wizard should have started. Click “Next”.

On the next screen, Change the installation path if required. Click “Next”.

On the next screen, you can create a desktop shortcut if you want and click on “Next”.

Choose the start menu folder. Keep selected JetBrains and click on “Install”.

Wait for the installation to finish.

Once installation finished, you should receive a message screen that PyCharm is installed. If you want to go ahead and run it, click the “Run PyCharm Community Edition” box first and click “Finish”.

 After you click on "Finish," the Following screen will appear.



9. You need to install some packages to execute your project in a proper way.

10. Open the command prompt/ anaconda prompt or terminal as administrator.

11. The prompt will get open, with specified path, type “pip install package name” which you want to install (like numpy, pandas, seaborn, scikit-learn, matplotlib.pyplot)

Ex: pip install numpy



**MODULES:**

**1. DATA OWNER:**

**Register:**

Data owner can Register and login with valid credentials

**Upload File:**

Data provider can upload the file.

**View File:**

Data Owner can view uploaded file once means whether the file is correctly uploaded or not.

**2. USER:**

**Register:**

Data user can do registration with his details.

**Login:**

The user needs to register and the data stored in MySQL database.

**Search a File:**

Data user can search a file based on the keyword ,if file is available then user can view file and send request to cloud to download the file.

**Get Key & Download**

Once User Request can accept get the key to cloud provider user can download the file.

**3.Cloud Provider**

**Login**

Cloud provider can login with his/her credentials.

**View Files:**

Cloud can view all uploaded files.

**View Users:**

Cloud can view all the users details to give permission for login the website.

**View Data Providers:**

Cloud can view all the data providers details to give permission for login the website.

**Send Key request to authority:**

Cloud gets a key from authority and send to the authority.

**4. Authority:**

**Login:**

Authority login and view users and give authorization to users.

**Generate key to users:**

Authority generate key to users.

**ALGORITHM:**

The encryption process uses a set of specially derived keys called round keys. These are applied, along with other operations, on an array of data that holds exactly one block of data? the data to be encrypted. This array we call the state array.

You take the following aes steps of encryption for a 128-bit block:

Derive the set of round keys from the cipher key.

Initialize the state array with the block data (plaintext).

Add the initial round key to the starting state array.

Perform nine rounds of state manipulation.

Perform the tenth and final round of state manipulation.

Copy the final state array out as the encrypted data (ciphertext).

The reason that the rounds have been listed as "nine followed by a final tenth round" is because the tenth round involves a slightly different manipulation from the others.

The block to be encrypted is just a sequence of 128 bits. AES works with byte quantities so we first convert the 128 bits into 16 bytes. We say "convert," but, in reality, it is almost certainly stored this way already. Operations in RSN/AES are performed on a two-dimensional byte array of four rows and four columns. At the start of the encryption, the 16 bytes of data.

**STEPS FOR EXECUTING THE PROJECTS**

1. Install the required packages

2. Defining the database connections.

3. Creating all the data base tables which we use in this project.

4. Remodel the CSS & HTML pages.

5. Build the project based on the modules.

6. Run 🡪 Run Python file(app.py) 🡪Copy the url link 🡪 Paste at any browser 🡪 then follow below screen shots.

**SYSTEM DESIGN**

**UML DIAGRAMS**

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems.

The UML represents a collection of best engineering practices that have proven successful inssss the modeling of large and complex systems.

The UML is a very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

**GOALS:**

The Primary goals in the design of the UML are as follows:

Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.

Provide extendibility and specialization mechanisms to extend the core concepts.

Be independent of particular programming languages and development process.

Provide a formal basis for understanding the modeling language.

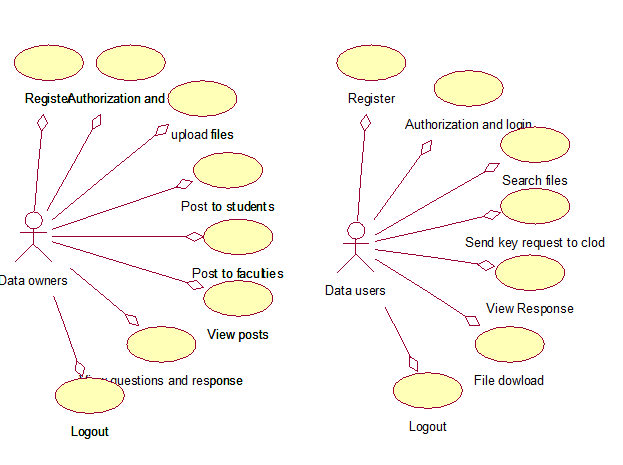
Encourage the growth of OO tools market.

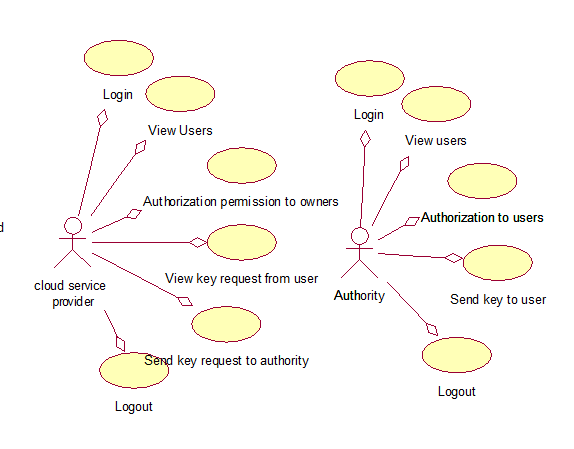
Support higher level development concepts such as collaborations, frameworks, patterns and components.

Integrate best practices.

**USE CASE DIAGRAM:**

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.





**CLASS DIAGRAM:**

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.



**SEQUENCE DIAGRAM:**

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.



**COLLABORATION DIAGRAM:**

In collaboration diagram the method call sequence is indicated by some numbering technique as shown below. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram. The method calls are similar to that of a sequence diagram. But the difference is that the sequence diagram does not describe the object organization whereas the collaboration diagram shows the object organization.



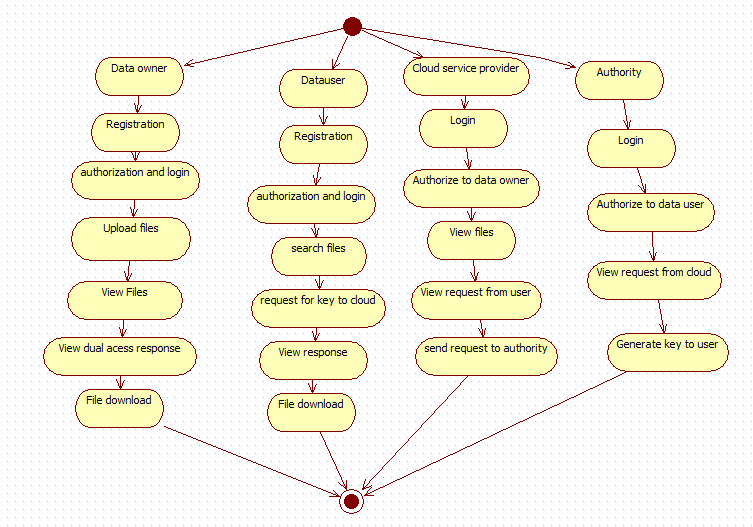
**DEPLOYMENT DIAGRAM**

Deployment diagram represents the deployment view of a system. It is related to the component diagram. Because the components are deployed using the deployment diagrams. A deployment diagram consists of nodes. Nodes are nothing but physical hardware’s used to deploy the application.

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**ACTIVITY DIAGRAM:**

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.



**COMPONENT DIAGRAM,**

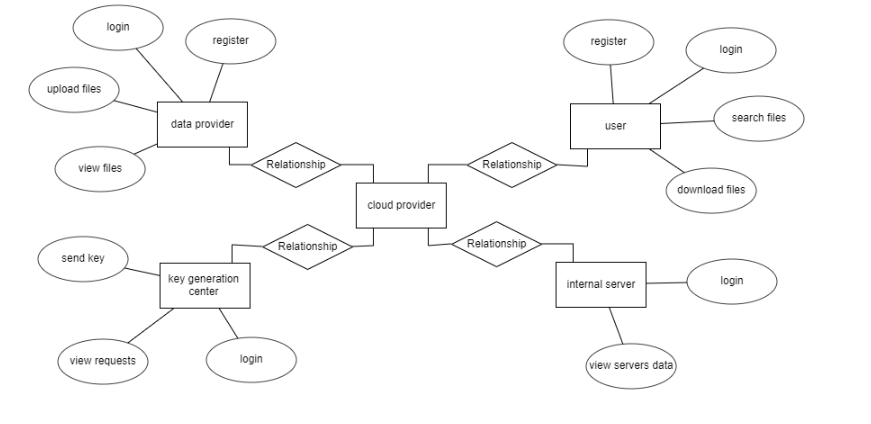
A component diagram, also known as a UML component diagram, describes the organization and wiring of the physical components in a system. Component diagrams are often drawn to help model implementation details and double-check that every aspect of the system's required functions is covered by planned development.



**ER Diagram:**

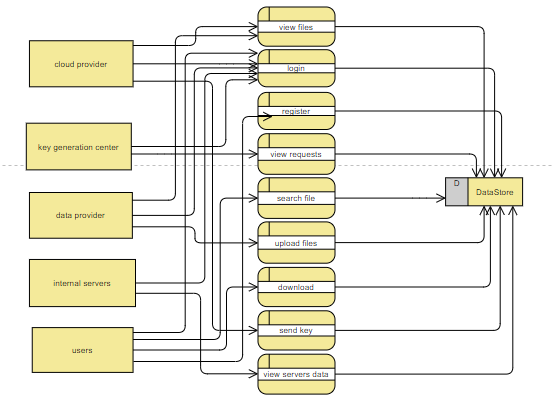
An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of E-R model are: entity set and relationship set.

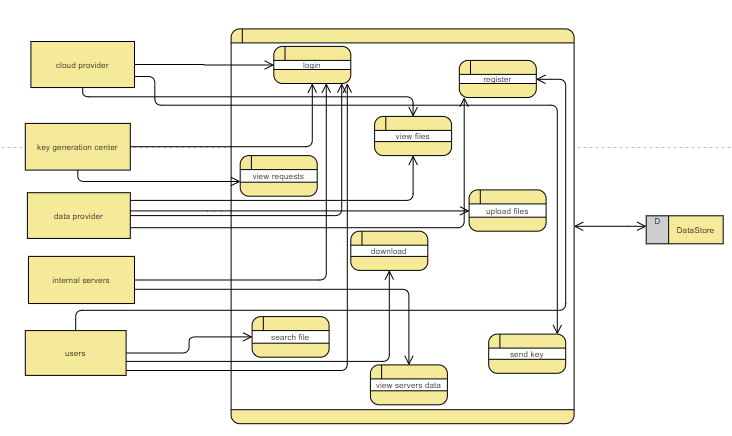
An ER diagram shows the relationship among entity sets. An entity set is a group of similar entities and these entities can have attributes. In terms of DBMS, an entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database. Let’s have a look at a simple ER diagram to understand this concept.



**DFD Diagram:**

A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both. It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.





**INTRODUCTION TO PYTHON**

**Python**

**What Is A Script?**

Up to this point, I have concentrated on the interactive programming capability of Python.  This is a very useful capability that allows you to type in a program and to have it executed immediately in an interactive mode

Scripts are reusable

Basically, a script is a text file containing the statements that comprise a Python program.  Once you have created the script, you can execute it over and over without having to retype it each time.

**Scripts are editable**

Perhaps, more importantly, you can make different versions of the script by modifying the statements from one file to the next using a text editor.  Then you can execute each of the individual versions.  In this way, it is easy to create different programs with a minimum amount of typing.

You will need a text editor

Just about any text editor will suffice for creating Python script files.

You can use Microsoft Notepad, Microsoft WordPad, Microsoft Word, or just about any word processor if you want to.

**Difference between a script and a program**

**Script:**

Scripts are distinct from the core code of the application, which is usually written in a different language, and are often created or at least modified by the end-user. Scripts are often interpreted from source code or byte code, whereas the applications they control are traditionally compiled to native machine code.

**Program:**

The program has an executable form that the computer can use directly to execute the instructions.

The same program in its human-readable source code form, from which executable programs are derived (e.g., compiled)

Python

What is Python? Chances you are asking yourself this. You may have found this book because you want to learn to program but don’t know anything about programming languages. Or you may have heard of programming languages like C, C++, C#, or Java and want to know what Python is and how it compares to “big name” languages. Hopefully I can explain it for you.

Python concepts

If you’re not interested in the the hows and whys of Python, feel free to skip to the next chapter. In this chapter I will try to explain to the reader why I think Python is one of the best languages available and why it’s a great one to start programming with.

• Open source general-purpose language.

• Object Oriented, Procedural, Functional

• Easy to interface with C/ObjC/Java/Fortran

• Easy-is to interface with C++ (via SWIG)

• Great interactive environment

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

Python is Interpreted − Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.

Python is Interactive − you can actually sit at a Python prompt and interact with the interpreter directly to write your programs.

Python is Object-Oriented − Python supports Object-Oriented style or technique of programming that encapsulates code within objects.

Python is a Beginner's Language − Python is a great language for the beginner-level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

**History of Python**

Python was developed by Guido van Possum in the late eighties and early nineties at the National Research Institute for Mathematics and Computer Science in the Netherlands.

Python is derived from many other languages, including ABC, Modula-3, C, C++, Algol-68, Smalltalk, and UNIX shell and other scripting languages.

Python is copyrighted. Like Perl, Python source code is now available under the GNU General Public License (GPL).

Python is now maintained by a core development team at the institute, although Guido van Possum still holds a vital role in directing its progress.

**Python Features**

Python's features include −

Easy-to-learn − Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly.

Easy-to-read − Python code is more clearly defined and visible to the eyes.

Easy-to-maintain − Python's source code is fairly easy-to-maintain.

A broad standard library − Python's bulk of the library is very portable and cross-platform compatible on UNIX, Windows, and Macintosh.

Interactive Mode − Python has support for an interactive mode which allows interactive testing and debugging of snippets of code.

Portable − Python can run on a wide variety of hardware platforms and has the same interface on all platforms.

Extendable − you can add low-level modules to the Python interpreter. These modules enable programmers to add to or customize their tools to be more efficient.

Databases − Python provides interfaces to all major commercial databases.

GUI Programming − Python supports GUI applications that can be created and ported to many system calls, libraries and windows systems, such as Windows MFC, Macintosh, and the X Window system of Unix.

Scalable − Python provides a better structure and support for large programs than shell scripting.

Apart from the above-mentioned features, Python has a big list of good features, few are listed below −

It supports functional and structured programming methods as well as OOP.

It can be used as a scripting language or can be compiled to byte-code for building large applications.

It provides very high-level dynamic data types and supports dynamic type checking.

IT supports automatic garbage collection.

It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java.

**Dynamic vs. Static**

Types Python is a dynamic-typed language. Many other languages are static typed, such as C/C++ and Java. A static typed language requires the programmer to explicitly tell the computer what type of “thing” each data value is.

For example, in C if you had a variable that was to contain the price of something, you would have to declare the variable as a “float” type.

This tells the compiler that the only data that can be used for that variable must be a floating point number, i.e. a number with a decimal point.

If any other data value was assigned to that variable, the compiler would give an error when trying to compile the program.

Python, however, doesn’t require this. You simply give your variables names and assign values to them. The interpreter takes care of keeping track of what kinds of objects your program is using. This also means that you can change the size of the values as you develop the program. Say you have another decimal number (a.k.a. a floating point number) you need in your program.

With a static typed language, you have to decide the memory size the variable can take when you first initialize that variable. A double is a floating point value that can handle a much larger number than a normal float (the actual memory sizes depend on the operating environment).

If you declare a variable to be a float but later on assign a value that is too big to it, your program will fail; you will have to go back and change that variable to be a double.

With Python, it doesn’t matter. You simply give it whatever number you want and Python will take care of manipulating it as needed. It even works for derived values.

For example, say you are dividing two numbers. One is a floating point number and one is an integer. Python realizes that it’s more accurate to keep track of decimals so it automatically calculates the result as a floating point number

**Variables**

Variables are nothing but reserved memory locations to store values. This means that when you create a variable you reserve some space in memory.

Based on the data type of a variable, the interpreter allocates memory and decides what can be stored in the reserved memory. Therefore, by assigning different data types to variables, you can store integers, decimals or characters in these variables.

**Standard Data Types**

The data stored in memory can be of many types. For example, a person's age is stored as a numeric value and his or her address is stored as alphanumeric characters. Python has various standard data types that are used to define the operations possible on them and the storage method for each of them.

Python has five standard data types −

Numbers

String

List

Tuple

Dictionary

**Python Numbers**

Number data types store numeric values. Number objects are created when you assign a value to them

**Python Strings**

Strings in Python are identified as a contiguous set of characters represented in the quotation marks. Python allows for either pairs of single or double quotes. Subsets of strings can be taken using the slice operator ([ ] and [:]) with indexes starting at 0 in the beginning of the string and working their way from -1 at the end.

**Python Lists**

Lists are the most versatile of Python's compound data types. A list contains items separated by commas and enclosed within square brackets ([]). To some extent, lists are similar to arrays in C. One difference between them is that all the items belonging to a list can be of different data type.

The values stored in a list can be accessed using the slice operator ([ ] and [:]) with indexes starting at 0 in the beginning of the list and working their way to end -1. The plus (+) sign is the list concatenation operator, and the asterisk (\*) is the repetition operator.

**Python Tuples**

A tuple is another sequence data type that is similar to the list. A tuple consists of a number of values separated by commas. Unlike lists, however, tuples are enclosed within parentheses.

The main differences between lists and tuples are: Lists are enclosed in brackets ([ ]) and their elements and size can be changed, while tuples are enclosed in parentheses (( )) and cannot be updated. Tuples can be thought of as read-only lists.

**Python Dictionary**

Python's dictionaries are kind of hash table type. They work like associative arrays or hashes found in Perl and consist of key-value pairs. A dictionary key can be almost any Python type, but are usually numbers or strings. Values, on the other hand, can be any arbitrary Python object.

Dictionaries are enclosed by curly braces ({ }) and values can be assigned and accessed using square braces ([]).

Different modes in python

Python has two basic modes: normal and interactive.

The normal mode is the mode where the scripted and finished .pie files are run in the Python interpreter.

Interactive mode is a command line shell which gives immediate feedback for each statement, while running previously fed statements in active memory. As new lines are fed into the interpreter, the fed program is evaluated both in part and in whole

**20 Python libraries**

1. Requests. The most famous http library written by Kenneth remits. It’s a must have for every python developer.

2. Scrappy. If you are involved in web scraping then this is a must have library for you. After using this library you won’t use any other.

3. Python. A guy toolkit for python. I have primarily used it in place of tinder. You will really love it.

4. Pillow. A friendly fork of PIL (Python Imaging Library). It is more user friendly than PIL and is a must have for anyone who works with images.

5. SQLAlchemy. A database library. Many love it and many hate it. The choice is yours.

6. Beautiful Soup. I know it’s slow but this xml and html parsing library is very useful for beginners.

7. Twisted. The most important tool for any network application developer. It has a very beautiful ape and is used by a lot of famous python developers.

8. Numbly. How can we leave this very important library? It provides some advance math functionalities to python.

9. Skippy. When we talk about numbly then we have to talk about spicy. It is a library of algorithms and mathematical tools for python and has caused many scientists to switch from ruby to python.

10. Matplotlib. A numerical plotting library. It is very useful for any data scientist or any data analyzer.

11. Pygmy. Which developer does not like to play games and develop them? This library will help you achieve your goal of 2d game development.

12. Piglet. A 3d animation and game creation engine. This is the engine in which the famous [python port](https://github.com/fogleman/Minecraft) of mine craft was made

13. Pit. A GUI toolkit for python. It is my second choice after python for developing GUI’s for my python scripts.

14. Pit. Another python GUI library. It is the same library in which the famous Bit torrent client is created.

15. Scaly. A packet sniffer and analyzer for python made in python.

16. Pywin32. A python library which provides some useful methods and classes for interacting with windows.

17. Notch. Natural Language Toolkit – I realize most people won’t be using this one, but it’s generic enough. It is a very useful library if you want to manipulate strings. But its capacity is beyond that. Do check it out.

18. Nose. A testing framework for python. It is used by millions of python developers. It is a must have if you do test driven development.

19. Simply. Simply can do algebraic evaluation, differentiation, expansion, complex numbers, etc. It is contained in a pure Python distribution.

20. I Python. I just can’t stress enough how useful this tool is. It is a python prompt on steroids. It has completion, history, shell capabilities, and a lot more. Make sure that you take a look at it.

**Numpy**

Humpy’s main object is the homogeneous multidimensional array. It is a table of elements (usually numbers), all of the same type, indexed by a tuple of positive integers. In numbly dimensions are called axes. The number of axes is rank.

• Offers Matlab-ish capabilities within Python

• Fast array operations

• 2D arrays, multi-D arrays, linear algebra etc.

Matplotlib

• High quality plotting library.

**Python class and objects**

These are the building blocks of OOP. Class creates a new object. This object can be anything, whether an abstract data concept or a model of a physical object, e.g. a chair. Each class has individual characteristics unique to that class, including variables and methods. Classes are very powerful and currently “the big thing” in most programming languages. Hence, there are several chapters dedicated to OOP later in the book.

The class is the most basic component of object-oriented programming. Previously, you learned how to use functions to make your program do something.

Now will move into the big, scary world of Object-Oriented Programming (OOP). To be honest, it took me several months to get a handle on objects.

When I first learned C and C++, I did great; functions just made sense for me.

Having messed around with BASIC in the early ’90s, I realized functions were just like subroutines so there wasn’t much new to learn.

However, when my C++ course started talking about objects, classes, and all the new features of OOP, my grades definitely suffered.

Once you learn OOP, you’ll realize that it’s actually a pretty powerful tool. Plus many Python libraries and APIs use classes, so you should at least be able to understand what the code is doing.

One thing to note about Python and OOP: it’s not mandatory to use objects in your code in a way that works best; maybe you don’t need to have a full-blown class with initialization code and methods to just return a calculation. With Python, you can get as technical as you want.

As you’ve already seen, Python can do just fine with functions. Unlike languages such as Java, you aren’t tied down to a single way of doing things; you can mix functions and classes as necessary in the same program. This lets you build the code

Objects are an encapsulation of variables and functions into a single entity. Objects get their variables and functions from classes. Classes are essentially a template to create your objects.

Here’s a brief list of Python OOP ideas:

• The class statement creates a class object and gives it a name. This creates a new namespace.

• Assignments within the class create class attributes. These attributes are accessed by qualifying the name using dot syntax: ClassName.Attribute.

• Class attributes export the state of an object and its associated behavior. These attributes are shared by all instances of a class.

• Calling a class (just like a function) creates a new instance of the class.

This is where the multiple copies part comes in.

• Each instance gets ("inherits") the default class attributes and gets its own namespace. This prevents instance objects from overlapping and confusing the program.

• Using the term self identifies a particular instance, allowing for per-instance attributes. This allows items such as variables to be associated with a particular instance.

**Inheritance**

First off, classes allow you to modify a program without really making changes to it.

To elaborate, by sub classing a class, you can change the behavior of the program by simply adding new components to it rather than rewriting the existing components.

As we’ve seen, an instance of a class inherits the attributes of that class.

However, classes can also inherit attributes from other classes. Hence, a subclass inherits from a superclass allowing you to make a generic superclass that is specialized via subclasses.

The subclasses can override the logic in a superclass, allowing you to change the behavior of your classes without changing the superclass at all.

**Operator Overloads**

Operator overloading simply means that objects that you create from classes can respond to actions (operations) that are already defined within Python, such as addition, slicing, printing, etc.

Even though these actions can be implemented via class methods, using overloading ties the behavior closer to Python’s object model and the object interfaces are more consistent to Python’s built-in objects, hence overloading is easier to learn and use.

User-made classes can override nearly all of Python’s built-in operation methods

**Exceptions**

I’ve talked about exceptions before but now I will talk about them in depth. Essentially, exceptions are events that modify program’s flow, either intentionally or due to errors.

They are special events that can occur due to an error, e.g. trying to open a file that doesn’t exist, or when the program reaches a marker, such as the completion of a loop.

Exceptions, by definition, don’t occur very often; hence, they are the "exception to the rule" and a special class has been created for them. Exceptions are everywhere in Python.

Virtually every module in the standard Python library uses them, and Python itself will raise them in a lot of different circumstances.

Here are just a few examples:

• Accessing a non−existent dictionary key will raise a Key Error exception.

• Searching a list for a non−existent value will raise a Value Error exception

. • Calling a non−existent method will raise an Attribute Error exception.

• Referencing a non−existent variable will raise a Name Error exception.

• Mixing data types without coercion will raise a Type Error exception.

One use of exceptions is to catch a fault and allow the program to continue working; we have seen this before when we talked about files.

This is the most common way to use exceptions. When programming with the Python command line interpreter, you don’t need to worry about catching exceptions.

Your program is usually short enough to not be hurt too much if an exception occurs.

Plus, having the exception occur at the command line is a quick and easy way to tell if your code logic has a problem.

However, if the same error occurred in your real program, it will fail and stop working. Exceptions can be created manually in the code by raising an exception.

It operates exactly as a system-caused exceptions, except that the programmer is doing it on purpose. This can be for a number of reasons. One of the benefits of using exceptions is that, by their nature, they don’t put any overhead on the code processing.

Because exceptions aren’t supposed to happen very often, they aren’t processed until they occur.

Exceptions can be thought of as a special form of the if/elf statements. You can realistically do the same thing with if blocks as you can with exceptions.

However, as already mentioned, exceptions aren’t processed until they occur; if blocks are processed all the time.

Proper use of exceptions can help the performance of your program.

The more infrequent the error might occur, the better off you are to use exceptions; using if blocks requires Python to always test extra conditions before continuing.

Exceptions also make code management easier: if your programming logic is mixed in with error-handling if statements, it can be difficult to read, modify, and debug your program.

**User-Defined Exceptions**

I won’t spend too much time talking about this, but Python does allow for a programmer to create his own exceptions.

You probably won’t have to do this very often but it’s nice to have the option when necessary.

However, before making your own exceptions, make sure there isn’t one of the built-in exceptions that will work for you.

They have been "tested by fire" over the years and not only work effectively, they have been optimized for performance and are bug-free.

Making your own exceptions involves object-oriented programming, which will be covered in the next chapter

. To make a custom exception, the programmer determines which base exception to use as the class to inherit from, e.g. making an exception for negative numbers or one for imaginary numbers would probably fall under the Arithmetic Error exception class.

To make a custom exception, simply inherit the base exception and define what it will do.

**Python modules**

Python allows us to store our code in files (also called modules). This is very useful for more serious programming, where we do not want to retype a long function definition from the very beginning just to change one mistake. In doing this, we are essentially defining our own modules, just like the modules defined already in the Python library.

To support this, Python has a way to put definitions in a file and use them in a script or in an interactive instance of the interpreter. Such a file is called a module; definitions from a module can be imported into other modules or into the main module.

**Testing code**

As indicated above, code is usually developed in a file using an editor.

To test the code, import it into a Python session and try to run it.

Usually there is an error, so you go back to the file, make a correction, and test again.

This process is repeated until you are satisfied that the code works. T

His entire process is known as the development cycle.

There are two types of errors that you will encounter. Syntax errors occur when the form of some command is invalid.

This happens when you make typing errors such as misspellings, or call something by the wrong name, and for many other reasons. Python will always give an error message for a syntax error.

**Functions in Python**

It is possible, and very useful, to define our own functions in Python. Generally speaking, if you need to do a calculation only once, then use the interpreter. But when you or others have need to perform a certain type of calculation many times, then define a function.

You use functions in programming to bundle a set of instructions that you want to use repeatedly or that, because of their complexity, are better self-contained in a sub-program and called when needed. That means that a function is a piece of code written to carry out a specified task.

To carry out that specific task, the function might or might not need multiple inputs. When the task is carved out, the function can or cannot return one or more values.

There are three types of functions in python:

Help (), min (), print ().

**Python Namespace**

Generally speaking, a namespace (sometimes also called a context) is a naming system for making names unique to avoid ambiguity. Everybody knows a name spacing system from daily life, i.e. the naming of people in first name and family name (surname).

An example is a network: each network device (workstation, server, printer,) needs a unique name and address. Yet another example is the directory structure of file systems.

The same file name can be used in different directories, the files can be uniquely accessed via the pathnames.   
Many programming languages use namespaces or contexts for identifiers. An identifier defined in a namespace is associated with that namespace.

This way, the same identifier can be independently defined in multiple namespaces. (Like the same file names in different directories) Programming languages, which support namespaces, may have different rules that determine to which namespace an identifier belongs.

Namespaces in Python are implemented as Python dictionaries, this means it is a mapping from names (keys) to objects (values). The user doesn't have to know this to write a Python program and when using namespaces.

Some namespaces in Python:

global names of a module

local names in a function or method invocation

built-in names: this namespace contains built-in functions (e.g. abs(), camp(), ...) and built-in exception names

**Garbage Collection**

Garbage Collector exposes the underlying memory management mechanism of Python, the automatic garbage collector. The module includes functions for controlling how the collector operates and to examine the objects known to the system, either pending collection or stuck in reference cycles and unable to be freed.

**Python XML Parser**

XML is a portable, open source language that allows programmers to develop applications that can be read by other applications, regardless of operating system and/or developmental language.

What is XML? The Extensible Markup Language XML is a markup language much like HTML or SGML.

This is recommended by the World Wide Web Consortium and available as an open standard.

XML is extremely useful for keeping track of small to medium amounts of data without requiring a SQL-based backbone.

XML Parser Architectures and APIs the Python standard library provides a minimal but useful set of interfaces to work with XML.

The two most basic and broadly used APIs to XML data are the SAX and DOM interfaces.

Simple API for XML SAX: Here, you register callbacks for events of interest and then let the parser proceed through the document.

This is useful when your documents are large or you have memory limitations, it parses the file as it reads it from disk and the entire file is never stored in memory.

Document Object Model DOM API : This is a World Wide Web Consortium recommendation wherein the entire file is read into memory and stored in a hierarchical tree − based form to represent all the features of an XML document.

SAX obviously cannot process information as fast as DOM can when working with large files. On the other hand, using DOM exclusively can really kill your resources, especially if used on a lot of small files.

SAX is read-only, while DOM allows changes to the XML file. Since these two different APIs literally complement each other, there is no reason why you cannot use them both for large projects.

**Python Web Frameworks**

A web framework is a code library that makes a developer's life easier when building reliable, scalable and maintainable web applications.

**Why are web frameworks useful?**

Web frameworks encapsulate what developers have learned over the past twenty years while programming sites and applications for the web. Frameworks make it easier to reuse code for common HTTP operations and to structure projects so other developers with knowledge of the framework can quickly build and maintain the application.

**Common web framework functionality**

Frameworks provide functionality in their code or through extensions to perform common operations required to run web applications. These common operations include:

URL routing

HTML, XML, JSON, and other output format tinplating

Database manipulation

Security against Cross-site request forgery (CSRF) and other attacks

Session storage and retrieval

Not all web frameworks include code for all of the above functionality. Frameworks fall on the spectrum from executing a single use case to providing every known web framework feature to every developer. Some frameworks take the "batteries-included" approach where everything possible comes bundled with the framework while others have a minimal core package that is amenable to extensions provided by other packages.

Comparing web frameworks

There is also a repository called [compare-python-web-frameworks](https://github.com/mattmakai/compare-python-web-frameworks) where the same web application is being coded with varying Python web frameworks, tinplating engines and object.

Web framework resources

When you are learning how to use one or more web frameworks it's helpful to have an idea of what the code under the covers is doing.

Frameworks is a really well done short video that explains how to choose between web frameworks. The author has some particular opinions about what should be in a framework. For the most part I agree although I've found sessions and database ORMs to be a helpful part of a framework when done well.

What is a web framework? Is an in-depth explanation of what web frameworks are and their relation to web servers?

Jingo vs. Flash vs. Pyramid: Choosing a Python web framework contains background information and code comparisons for similar web applications built in these three big Python frameworks.

This fascinating blog post takes a look at the code complexity of several Python web frameworks by providing visualizations based on their code bases.

Python’s web frameworks benchmarks  is a test of the responsiveness of a framework with encoding an object to JSON and returning it as a response as well as retrieving data from the database and rendering it in a template. There were no conclusive results but the output is fun to read about nonetheless.

What web frameworks do you use and why are they awesome? Is a language agnostic Reedit discussion on web frameworks? It's interesting to see what programmers in other languages like and dislike about their suite of web frameworks compared to the main Python frameworks.

This user-voted question & answer site asked "What are the best general purpose Python web frameworks usable in production?” The votes aren't as important as the list of the many frameworks that are available to Python developers.

Web frameworks learning checklist

Choose a major Python web framework (Jingo or Flask are recommended) and stick with it. When you're just starting it's best to learn one framework first instead of bouncing around trying to understand every framework.

Work through a detailed tutorial found within the resources links on the framework's page.

Study open source examples built with your framework of choice so you can take parts of those projects and reuse the code in your application.

Build the first simple iteration of your web application then go to the [deployment](https://www.fullstackpython.com/deployment.html) section to make it accessible on the web.

**SYSTEM STUDY**

**2.1 FEASIBILITY STUDY**

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

ECONOMICAL FEASIBILITY

TECHNICAL FEASIBILITY

SOCIAL FEASIBILITY

**ECONOMICAL FEASIBILITY**

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

**TECHNICAL FEASIBILITY**

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

**SOCIAL FEASIBILITY**

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

**SYSTEM TESTING**

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the

Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

**TYPES OF TESTS**

**Unit testing**

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

**Integration testing**

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

**Functional test**

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

**SYSTEM TEST**

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

**White Box Testing**

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

**Black Box Testing**

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

**6.1 Unit Testing:**

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

**Test objectives**

All field entries must work properly.

Pages must be activated from the identified link.

The entry screen, messages and responses must not be delayed.

Features to be tested

Verify that the entries are of the correct format

No duplicate entries should be allowed

All links should take the user to the correct page.

**6.2 Integration Testing**

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

**6.3 Acceptance Testing**

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

**CONCLUSION:**

In this paper. We addressed an interesting and long-lasting problem in cloud-based data sharing, and presented two dual access control systems. The proposed systems are resistant to DDoS/EDoS attacks. We state that the technique used to achievethefeatureofcontrolondownloadrequestis“transplantable”tootherCP-ABEconstructions.Ourexperimental results show that the proposed systems do not impose any signiﬁcant computational and communication overhead (compared to its underlying CP-ABE building block). In our enhanced system, we employ the fact that the secret information loaded into the enclave cannot be extracted. However, recent work shows that enclave may leak some amount so fits secret(s) to a malicious host through the memory access patterns or other related side-channel attacks. The model of transparent enclave execution is hence introduced in. Constructing a dual access control system for cloud data sharing from transparent enclave is an interesting problem. In our future work ,we will consider the corresponding solution to the problem

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