SYSTEM ANALYSIS & DESIGN

UNIT-3

Information Gathering:

Information Gathering is the act of gathering different kinds of information against the targeted victim or system. It is the first step or the beginning stage of Ethical Hacking, where the penetration testers or hackers (both black hat or white hat) performed this stage; this is a necessary and crucial step to be performed.

Information Gathering is a very key part of the feasibility analysis process. The main aim of fact-finding techniques is to determine the information requirements of an organization used by analysts to prepare precise SRS (software requirements specification) understood by user.

Information gathering tools:

1. Interviews and Questionnaires:

Generally, the onsite observation is directed primarily towards describing and understanding events as they occur.

On the other hand, we need to learn about people's knowledge, feelings or motivations. Therefore, other information gathering tools are used for analysis.

If we wish to know about something, we simply ask someone about it directly, but we cannot get a right answer. When asked by direct questions, the respondent may yield information that is invalid. The information can be successfully obtained with interviews or questionnaires.

2. Revision of Literature, Procedures and Forms:

few system problems are difficult, therefore, as in the first step, a search of the literature through professionals; references and procedure manuals, company studies, government publications, or consultant studies is very useful. The primary drawback of this search is time. It is very difficult to such reports. Publications may be expensive and the information may be out dated due to a time lag in publication.

Procedures manuals and forms are very useful sources for the analyst. They describe the formation and functions of the present system. Up-to-date and good manuals save hours of information gathering time. Printed forms are widely used for capturing and providing information.

3. On Site Observation:

Another information gathering tool used in system studies is called the ‘on site observation’. On site observation is the process of recognizing and noting people, objects and gets the information. The analyst’s role is that of an information seeker who is expected to be detached from the system being observed. The role permits participation with the user staff openly and freely.

Types of onsite observations:

1. **Natural or contrived:** A natural observation occurs in a setting such as the employee’s place of work, the observer in a place like a laboratory sets up a contrived observation.
2. **Obtrusive or unobtrusive:** An obtrusive observation takes place when the respondent knows he/she is being observed; an unobtrusive observation take place in a contrived way such as behind a one-way mirror.
3. **Direct or indirect:** A direct observation takes place when the analyst actually observes the subject or the system at work. In an indirect observation, the analyst uses mechanical devices such as cameras and videotapes to capture information.
4. **Structured or unstructured:** In a structured observation, the observer looks for and records a specific action. Unstructured methods place the observer in a situation to observe whatever might be pertinent at the time.

Interview:

An interview is a formal conversation between an interviewer and interviewee where the former seeks answers from the latter, which checks their capability in joining the desired post. When broken down into two separate terms, interviews are 'inter' and 'view,' meaning seeing each other.

objectives of the interview.

- It helps to verify the precision of the provided facts and data by the candidate.
- The interview helps to obtain additional information about the skills and knowledge of the interviewee.
- The interview not only assesses a candidate's skills but also checks their suitability for the job.
- The interview provides the candidate with general facts and necessary descriptions about the job and the company.
- An interview gives an intuition into the candidate's rational knowledge and creativity they possess.
- Job descriptions are given at the time of the interview. The interviewer informs the company's expectations from them.
- Through the interview process, the recruiter gets to know about the candidate's skills and lacks the potential abilities to be trained according to their job role.

Arranging the Interview:

Interview stages are the parts of the interview process through which the hiring manager or interviewer leads the job candidate. There are 5 steps to arrange an interview:-

1. Conducting introductions

The first stage of the interview process is meeting the hiring manager and exchanging introductions. This usually involves a handshake and formally introducing yourself to the hiring manager. Use a friendly and professional greeting like "it's a pleasure to meet you," when introducing yourself to the hiring manager.

2. Making conversation

This stage is important for helping you develop a rapport with the interviewer. They may ask some questions to get to know you on a personal level so they can assess whether your personality is a good fit for their team. By spending some time getting to know the interviewer and the team, you may feel more relaxed and comfortable during the next stage of the interview.

3. Gathering information

Next, the interviewer may ask you to give a brief elevator pitch about yourself and your interest in working for their team as a way of gathering more information about you. It's typical for interviewers to ask you to tell them about yourself, inviting you to give a brief summary of your career path, what led you to apply for the position and what qualifications you have that make you the right candidate for the job. Practicing your pitch ahead of the interview can help you organize your ideas and present them with confidence and professionalism.

4. Performing the interview

Once you've given your pitch, the hiring manager begins the structured portion of the interview. During this portion of the interview, focus on demonstrating the qualities that make you the best candidate for the job. Explain your skills and qualifications and how you can apply them to benefit the organization.

5. Concluding

Once the question-and-answer portion of the interview ends, the interview moves toward its conclusion. At the end of the interview, shake the interviewer's hand again and thank them for their time. Express your appreciation for the opportunity to interview and your interest in working with them in the future. It's also a good idea to send a thank-you note within a day of the interview.

Types of Interviews:

1. Structured Interview:

It is the traditional form of an interview. Preset standardized questions are asked from the interviewee and are the same for all the candidates. It is the kind of interview that gives the chance to examine all the candidates' skills and abilities impartially. These questions also help the interviewer to compare the responses and to choose the best.

2. Unstructured Interview

It is just the opposite of structured interviews. It is a free-flowing conversation. This type of interview is also known as Informal interview. Here the interviewer already has a definite idea in mind about the questions to be asked. Generally, questions are made and asked during the interview. These questions can change according to the responses the candidate gives. An unstructured interview does not follow any formal rules and procedures.

3. Stress Interview

These kinds of interviews are very rare. In this, the interviewer puts the interviewee under a stressful situation to test their presence of mind and to see how they manage the crisis at a given time. The interviewer tends to make the interviewee nervous by asking tons of questions at the same time. It is done to see whether the candidate can cope up with a crisis and not panic.

4. One to One Interview

It is a general interview. There are just two persons, i.e., the interviewer and the interviewee, and a formal discussion takes place face to face about the candidate's skills and abilities. The interviewer asks general and technical questions to check the suitability.

5. Panel Interview

A panel interview is known as a board interview; the interview takes place between one candidate and a panel of members of the company, usually more than two. Each one gives different scores to the candidates and combines them to see if the candidate is qualified. In a panel interview, candidates are often victims of personal biases, and it is not feasible for organizations that take many interviews daily.

6. Telephonic Interview

Telephonic interviews are conducted over the phone and are economical and less time-consuming. Through these interviews, the company can select promising individuals for the job. Its main objective is to limit the list of candidates and appoint the best ones. These are more

accurate than one to one interview for judging interviewees' intelligence and interpersonal skills. The candidates are usually surprised by the unexpected call from the recruiter.

7. Video Interview

One of the newest forms of interviews is conducted through various video conferences, online chats, or messaging due to their rapidity and inexpensiveness. It saves time and money. The best part of these interviews is that both the interviewer and interviewee need not be in the same place, not even the same continent.

8. Depth Interview

As the term itself says, it distinguishes the interviewee in-depth. These are detail and discovery-oriented. It covers the candidate's life history, academic qualifications, interests, hobbies, and professional work experience. The interviewer here is a listener and wants to know in detail about the candidates, allowing more time and a free flow of conversation and making a friendly approach.

9. Open Call Interview

Open call interviews, most commonly known as walk-in interviews, are conducted on the spot, and the questions are not preset. The questions vary according to the response of the candidates. Most of these types of interviews are for seasonal or temporary job roles.

Questionnaire:

A questionnaire is a research instrument that consists of a set of questions or other types of prompts that aims to collect information from a respondent. A research questionnaire is typically a mix of close-ended questions and open-ended questions.

Types of Questionnaires:

Based on the type of questions used, questionnaires are as follows:

1. Structured questionnaire:

Comes under quantitative research. It includes a low number of researchers and the high number of respondents. They are also called as closed questionnaires. They usually include answers such as very bad, bad, good, very good and so on.

2. Unstructured questionnaire:

A version of the qualitative survey. They are usually based around more open questions. Open questions also mean recording more data as the respondents can point out what is important for them, in their own words and methods. But it is more difficult from the researcher’s side

since it does not give the correct idea of the topic and moreover, a proper understanding of the data is needed.

3. Scaled questionnaires:

The respondents are asked to scale the answers based on a given rating prescribed by the question.

Depending on the type of format used in questionnaires, they are divided into the following.

Open format questions:

- These are the type of questions that are used to allow the respondents to express their views in a free-flowing manner.
- An ideal questionnaire is a type of questionnaire that includes open-ended questions and also has feedback and suggestions for future improvements.

Closed format questions:

Multiple-choice questions come under this category. The user is restricted to answer their opinions through the options that are set by the surveyor. Hence, these are also called as close-ended questions.

4. Hand Delivered Questionnaire:

This type of questionnaire is also called direct questionnaire where the researcher directly goes to the respondent and shares the questions.

The respondent needs to tick the right answers in front of the researcher.

5. Mailed Questionnaire:

This type of questionnaire is mainly used by most of the researchers. Here the respondents would be living somewhere far and the questionnaire is sent to him by post. Along with the questions, a set of instruction list is also sent to him.

The respondent needs to write the answers and send it back to the respective person or agency.

6. Mixed questionnaire:

- Comprises of both closed and open type of questions.
- Most used in the social research sector.

7. Pictorial questionnaire:

- It is not used regularly.
- Usage of pictures impacts the respondents in answering the questions

- Mostly used for studies based on social attitudes and prejudices in children

The Unstructured Alternative:

The Unstructured interview is non-directive information gathering technique. It allows respondents to answer questions freely in their own words. The responses in this case are spontaneous and self-revealing.

The Structured Alternative:

In this alternative the questions are presented with exactly the same wordings and in the same order to all subjects. Structured interviews and questionnaires may differ in the amount of structuring of the questions. Questions may be either closed or open-ended. An open-ended question requires no response direction or specific response. Closed questions are those, in which the responses are presented as a set of alternatives.

Structured Analysis:

Structured Analysis is a development method that allows the analyst to understand the system and its activities in a logical way. It is a systematic approach, which uses graphical tools that analyze and refine the objectives of an existing system and develop a new system specification which can be easily understandable by user.

Structured Analysis Tools:

1. The Dataflow Diagram (DFD)
2. Data Dictionary
3. Structure Charts
4. Decision Trees
5. Structured English

Tools of Structured Analysis:

1. Data Flow Diagrams (DFD):

Data flow diagram is graphical representation of flow of data in an information system. It is capable of depicting incoming data flow, outgoing data flow and stored data. The DFD does not mention anything about how data flows through the system.

Types of DFD:

Data Flow Diagrams are either Logical or Physical.

Logical DFD - This type of DFD concentrates on the system process, and flow of data in the system.

Physical DFD - This type of DFD shows how the data flow is actually implemented in the system. It is more specific and closer to the implementation.

DFD Components:

DFD can represent Source, destination, storage and flow of data using the following set of components -

Entities - Entities are source and destination of information data. Entities are represented by rectangles with their respective names.

Process - Activities and action taken on the data are represented by Circle or Round-edged rectangles.

Data Storage - There are two variants of data storage - it can either be represented as a rectangle with absence of both smaller sides or as an open-sided rectangle with only one side missing.

Data Flow - Movement of data is shown by pointed arrows. Data movement is shown from the base of arrow as its source towards head of the arrow as destination.

2. Data Dictionary:

Data dictionary is the centralized collection of information about data. It stores meaning and origin of data, its relationship with other data, data format for usage etc. Data dictionary has rigorous definitions of all names in order to facilitate user and software designers.

Contents:

Data dictionary should contain information about the following

Data Flow: data flows are data structures in motion

Data Structure: a group of data elements handled as a unit.

Data Elements: smallest unit of data that provides for no further decomposition.

Data Stores: data stores are data structures at rest. A data store is a location where data structures are temporarily located.

Data Processing: There are two types of Data Processing:

- **Logical:** As user sees it
- **Physical:** As software sees it

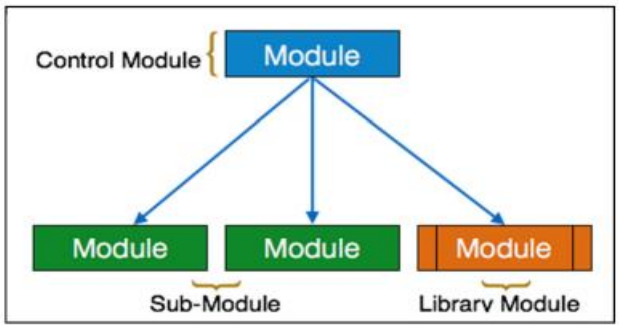
3. Structure Charts

Structure chart is a chart derived from Data Flow Diagram. It represents the system in more detail than DFD. It breaks down the entire system into lowest functional modules, describes functions and sub-functions of each module of the system to a greater detail than DFD.

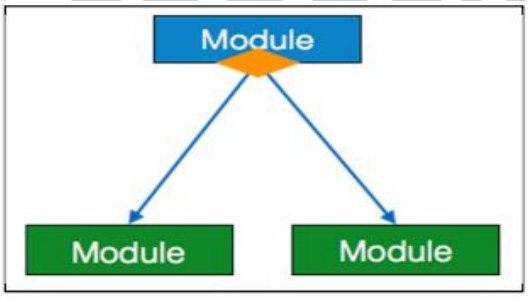
Structure chart represents hierarchical structure of modules. At each layer a specific task is performed.

Here are the symbols used in construction of structure charts -

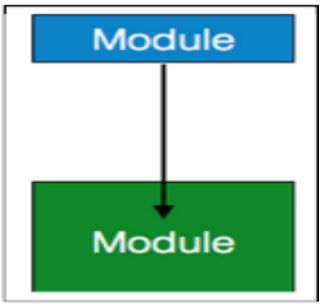
Module - It represents process or subroutine or task. A control module branches to more than one sub-module.



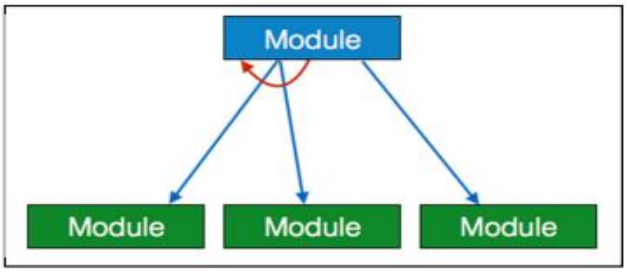
Condition - It is represented by small diamond at the base of module. It depicts that control module can select any of sub-routine based on some condition.



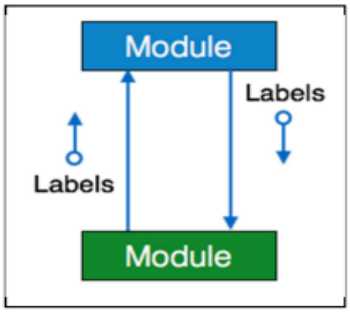
Jump - An arrow is shown pointing inside the module to depict that the control will jump in the middle of the sub-module.



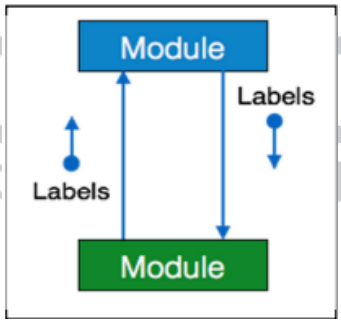
Loop - A curved arrow represents loop in the module. All sub-modules covered by loop repeat execution of module.



Data flow - A directed arrow with empty circle at the end represents data flow.



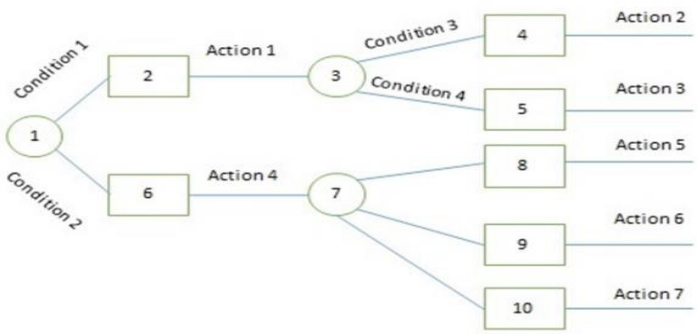
Control flow - A directed arrow with filled circle at the end represents control flow.



4. Decision Trees:

Decision trees are a method for defining complex relationships by describing decisions and avoiding the problems in communication. A decision tree is a diagram that shows alternative actions and conditions within horizontal tree framework. Thus, it depicts which conditions to consider first, second, and so on.

Decision trees depict the relationship of each condition and their permissible actions. A square node indicates an action and a circle indicates a condition.



5. Structured English:

Structured English is a narrative form of English written as a series of blocks that use indentation and capitalization to represent a hierarchical structure of logic specifications. This method does not show any decisions or rules, but it states the rules and is used when an individual or an organization is trying to overcome the problems of an ambiguous language by stating the actions and conditions used when making decisions and formulating procedures.

Structured English is based on structured logic; it is used when process logic involves formulas or iteration, or when structured decisions are not too complex. Structured English is used to express all logic in terms of sequential structures, decision structures, iterations and case structures. This modified form of English is used to specify the logic of information processes by using a subset of English vocabulary to express process procedures.