



**IT - ITeS SSC
NASSCOM**

Participant Handbook

Sector

IT-ITES

Sub - Sector

IT Services

Occupation

Application Management



Reference ID: SSC/Q0508, Version 2.0

NSQF Level 3



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**Junior Software
Developer**

Published by

IT – ITeS Sector Skill Council NASSCOM

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Second Edition, August, 2022

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“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. **”**

Shri Narendra Modi

Prime Minister of India



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Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

IT-ITeS Sector Skills Council NASSCOM

for

SKILLING CONTENT: PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/ Qualification Pack: Junior Software Developer QP No

SSC/Q0508, NSQF Level 3

Date of Issuance: January 27th, 2022

Valid up to*: January 27th, 2025

*Valid up to the next review date of the Qualification Pack or the

'Valid up to' date mentioned above (whichever is earlier)

Authorised Signatory
(IT-ITeS Sector Skills Council NASSCOM)

Acknowledgments

This participant's handbook meant for Junior Software Developers is a sincere attempt to ensure the availability of all the relevant information to the existing and prospective job holders in this job role. We have compiled the content with inputs from the relevant Subject Matter Experts (SMEs) and industry members to ensure it is the latest and authentic. We express our sincere gratitude to all the SMEs and industry members who have made invaluable contributions to the completion of this participant's handbook. We would also like to thank all the experts and organizations who have helped us by reviewing the content and providing their feedback to improve its quality.

This handbook will help deliver skill-based training in the field of Junior Software Developer. We hope that it will benefit all the stakeholders, such as participants, trainers, and evaluators. We have made all efforts to ensure the publication meets the current quality standards for the successful delivery of QP/NOS-based training programs. We welcome and appreciate any suggestions for future improvements to this handbook.

About this book

This participant handbook has been designed to serve as a guide for participants who aim to obtain the required knowledge and skills to undertake various activities in the role of a Junior Software Developer. Its content has been aligned with the latest Qualification Pack (QP) prepared for the job role. With a qualified trainer's guidance, the participants will be equipped with the following for working efficiently in the job role:

- **Knowledge and Understanding:** The relevant operational knowledge and understanding to perform the required tasks.
- **Performance Criteria:** The essential skills through hands-on training to perform the required operations to the applicable quality standards.
- **Professional Skills:** The Ability to make appropriate operational decisions about the field of work.

The handbook details the relevant activities to be carried out by a Junior Software Developer. After studying this handbook, job holders will be adequately skilled in carrying out their duties according to the applicable quality standards. The handbook is aligned with the following National Occupational Standards (NOS) detailed in the latest and approved version of Junior Software Developer QP:

1. SSC/N0506: Assist in performing software construction and software testing entry-level tasks in the IT Services industry
2. SSC/N9001: Manage your work to meet requirements
3. SSC/N9002: Work effectively with colleagues
3. SSC/N9003: Maintain a healthy, safe and secure working environment
4. SSC/N9004: Provide data/information in standard formats

The handbook has been divided into an appropriate number of units and sub-units based on the content of the relevant QP. We hope it will facilitate easy and structured learning for the participants, allowing them to obtain enhanced knowledge and skills.

Symbols Used



Key Learning
Outcomes



Exercise



Notes



Unit
Objectives



Activity

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1. IT-ITeS/IT Support Services Industry – An Introduction

Unit 1.1 - Overview of the Indian IT-ITeS Industry

Unit 1.2 - Career Opportunities for Technical Support Engineers and Job Responsibilities



Key Learning Outcomes



By the end of this module, participants will be able to:

1. Comprehend various delivery models used in the IT-BPM industry.
2. Explain the current growth and development standards of the IT-BPM industry.

UNIT 1.1: IT-ITeS/BPM Industry – An Introduction

Unit Objectives



By the end of this unit, participants will be able to:

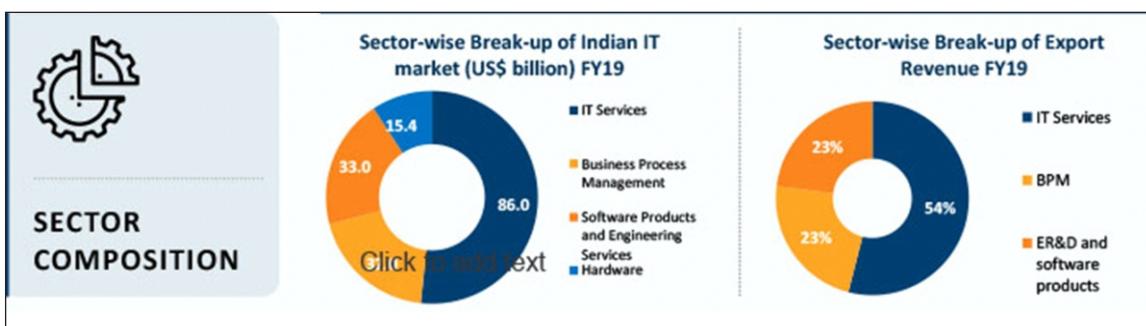
1. Explain the relevance of the IT-ITeS sector.
2. Collate information, evidence, and articles regarding the IT-Application development industry through internet browsing.

1.1.1 India's IT-ITeS/BPM Industry

- Information Technology (IT), Information Technology Enabled Services (ITeS)/ Business Process Management (BPM) are vital to the Indian economy.
- The IT and BPM market accounts for 9.3% of India's GDP and 56% of the global outsourcing market.
- India's IT and business services market is projected to reach US\$ 19.93 billion by 2025.
- According to an estimate, IT spending in India is forecasted to increase to US\$ 101.8 billion in 2022 from US\$ 81.89 billion in 2021.
- India's IT & BPM industry is well-diversified across verticals, such as Banking, Financial Services, and Insurance (BFSI) sector, telecom and retail.
- In FY21, India ranked third worldwide with 608,000 cloud experts across all verticals, including technology.
- The computer software and hardware sector in India attracted cumulative foreign direct investment (FDI) inflows worth US\$ 81.31 billion between April 2000 and December 2021.
- IT companies are one of the top employers in the country's organized sector.

Source: www.ibef.org/industry/information-technology-india

Sector Composition



Source: www.ibef.org/industry/information-technology-india/infographi

Fig. 1.1.1 Sector Composition of the Indian IT Market

It has been noticed that the IT Services and ITeS-BPO industries have impacted the Indian economy's growth. The Indian IT/ITeS industry has become one of the country's greatest success stories, putting it on the worldwide map as a leader in Information Technology (IT) and Business Process Outsourcing (BPO). In every way, the Indian information technology (IT) and information technology-enabled services (ITeS) industries are intertwined. The industry has not only improved India's global image. However, it has also fueled economic progress and contributed significantly to social transformation. With its low cost, large resource pool, and competence, India has the opportunity to tap into a booming market.

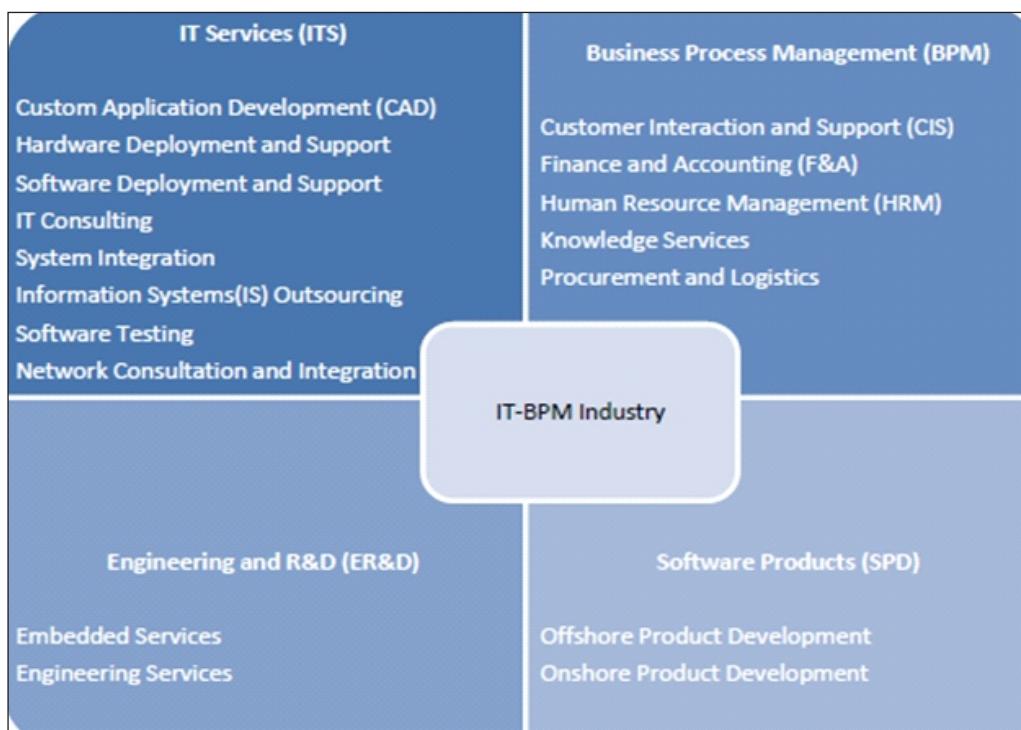


Fig. 1.1.2 Structure of the IT-BPM Industry

1.1.2 Search on the Internet About IT-ITeS/BPM Industry

1. Android/Tablet

- On the Android phone or tablet, open the Chrome app Chrome.
- In the address bar, type IT-ITeS/BPM industry and search.
- Tap the result, Go, or Continue Continue.

Tip: As one types, one may get suggestions based on the web and app activity. Users can delete individual suggestions from the search history or hide sections of suggestions based on the activity when they appear.

2. Computer

- On the computer, open Chrome  application.
- In the address bar, enter **IT-ITeS/BPM** industry search.
- Select a result or press Enter.

Tip: As one types, one may get suggestions based on the web and app activity. Users can delete individual suggestions from the search history or hide sections of suggestions based on the activity when they appear.

Notes



UNIT 1.2: Job Responsibilities and Career Opportunities for a Junior Software Developer

Unit Objectives



By the end of this unit, participants will be able to:

1. Discuss the role and responsibilities of a Juniors Software Developer.
2. Explain the personal attributes required in a Junior Software Developer.
3. Identify the career path for a Junior Software Developer.

1.2.1 Junior Software Developer

Software developer, also referred to as a computer programmer, plays a key role in designing, installing, testing and maintaining software systems. The programs one creates are likely to help businesses to be more efficient and provide better services.

Software developers are employed in almost every business area, from engineering and retail to banking, transportation, and government agencies, so the projects one work on might be very diverse.

1.2.2 Job Responsibilities of a Software Developer

- Examining current systems.
- Outlining system enhancement suggestions, including price estimates.
- Close collaboration with personnel, analysts, and designers.
- Creating thorough requirements as well as developing the programme codes.
- Testing the product in real-world settings under controlled conditions before launch.
- Creating user instruction manuals.
- Maintaining the systems once they are operational.

Required Skills

Prior experience in programming is required. The precise language used will, however, be determined by the demands of the individual firm. Among the abilities that employers will want are:

If one wants to work in software development, one must have programming knowledge. One'll need to be familiar with both web-based applications and more conventional ones like Java and Visual Basic. The key skills to play up when one's looking for a job as a software developer are as follows:

- Expertise in current computer hardware and software
- Ability to use one or more development language C++, PHP, etc.)
- Strong communication skills
- Ability to work in a team
- Eye for detail and identifying problems
- An understanding of business
- Analytical and commercial experience

Most employers will expect one to have a relevant computing qualification or degree. If one has a degree, but it's not related to IT, one could apply for a graduate trainee scheme, or take a postgraduate course to build up the relevant skills.

Some of the most sought after skills by employers include Java, C++, Smalltalk, Visual Basic, Oracle, Linux and .NET, .PHP.

Notes



UNIT 1.3: IT Services- An Introduction

Unit Objectives



By the end of this unit, participants will be able to:

1. List the many service categories and sub-industries that make up the software development sector, together with a brief description of each.
2. Classify these services and their related industries as part of application development.
3. Compile the information needed for managing and sustaining IT services and the tiers within them.
4. For each project involving IT services, create a process flow.
5. List the different support services that will be provided in an IT services project.

1.3.1 Software Industry

The system of regulations that allow services to be performed on the physical device distinguishes software from hardware. When it comes to the exchange of software between software producers and software consumers, the software industry actually makes up a very small share of the overall computer programming activity that occurs. Many in-house software applications developed for very specific purposes are never made available to the public. Since the industry's beginning in the 1950s, it has undergone a number of revolutionary changes, from the straightforward punch-card programming services provided in 1955 to the few businesses that had computers to the revolutionary trends of software as a service (SaaS), device programming for the Internet of Things (IoT), and the acceptance of open-source alternatives by major corporations.

1.3.2 Sub-Sectors of the Software Industry

The four primary segments of the software industry are SaaS, open source, system services, and programming services.

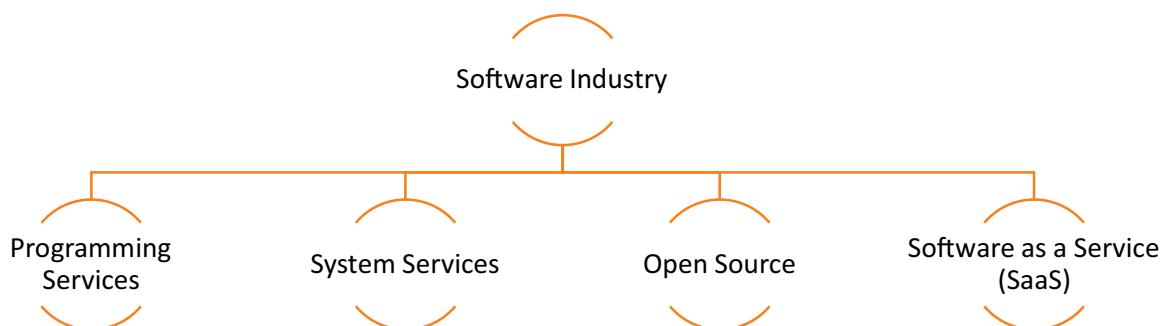


Fig. 1.3.1 Sub-Sectors of the Software Industry

- **Programming Services** - This has traditionally been the largest industry, with companies like Microsoft Corporation, Automatic Data Processing, Inc., Oracle Corporation, and SDC Technologies, Inc. These organizations frequently pioneered solutions to commercial demands for data analysis, data storage and organization, or programmes to run machines.
- **System Services** - Although programming was the most important software sector early in computer history, system services grew rapidly in the 1960s and 1970s, then exploded in the 1980s with the rise of personal computers (PCs) and the need for an all-encompassing operating system like Microsoft's original disc operating system (DOS), which was released in 1981.
- **Open Source** - With the rise of the Internet, cloud systems, and corporations prepared to delve more readily into open-source ecosystems such as the Linux operating system, programming or software engineering has become a very in-demand career. Open source refers to a code base that was produced and is freely available to the public. However, most organizations require adjustments to the code bases to meet their requirements. The Android operating system is another open-source code base.
- **Software as a Service (SaaS)** - With the growth of cloud computing and the migration of most big and small organizations to the cloud, SaaS has become more common than system software for specific business purposes. This software is stored on the authors' servers, and customers access it over the Internet, sometimes known as the cloud. All upgrades, fixes, and bugs are handled on the creator's side, with the client using a subscription-based paradigm. The SaaS market is expected to develop steadily over the next decade, reaching over 30% by 2018. It is expected that by the end of 2016, more than 80% of all firms would have implemented at least one component of cloud computing inside their information technology (IT) infrastructures, such as infrastructure as a service (IaaS), platform as a service (PaaS), or SaaS applications.

1.3.3 Process Flow

Process flows (or process diagrams) are visual representations of all the tasks and interactions involved in a process.

A process diagram could serve two purposes:

- To describe how a process works
- To enhance a process

In most circumstances, one can design a process flow with flow chart software such as Visio or LucidChart by dragging and dropping symbols representing tasks, inputs, decision points, and so on, and then linking them in the correct sequence.

This enables anybody outside of or unfamiliar with the process to follow the workflow step-by-step without requiring extensive expository explanation.

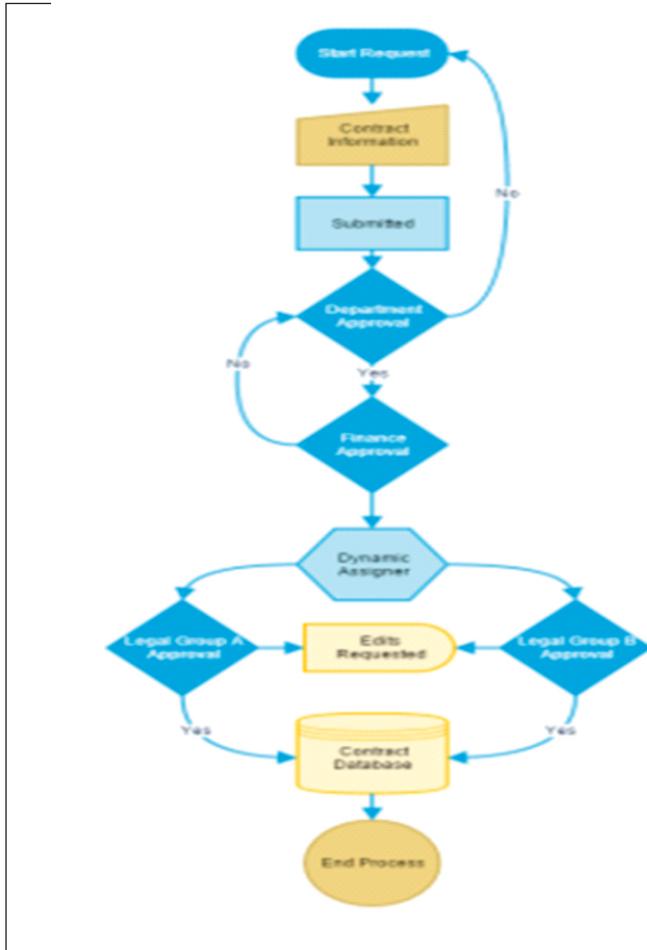


Fig. 1.3.2 Process Flow Chart

Tips for Creating Business Process Flow Diagrams

Creating a business process flow diagram may appear straightforward at first, but as one learns more about how work is done in the firm, one may find one self challenging to replicate it graphically. Here are some pointers:

- Each box or symbol should only represent ONE action or decision.
- When utilizing a decision box (often a diamond), identify the arrows going to the next logical stages with a question (Completed? Approved?, and soon).
- Avoid having arrows cross over each other since this might be confusing to viewers.
- Sub processes should be represented by separate/child flow diagrams. This is depicted in the primary process image (e.g., "See Approval Sub process.")

1.3.4 IT Support Service

Information technology refers to the collection of procedures and activities using computers, websites, and the internet. In the new age where nearly everything is computer-driven, all IT-related tasks and products require support and maintenance. This is when IT support services come in handy. They essentially refer to the process of assisting with various IT-related concerns such as network configuration, cloud computing, database administration, and so on. The primary purpose of these services is to ensure that all IT-related functions run smoothly.

Types of IT Support Services

1. Managed IT Services: Most small firms invest in managed IT services. However, managing a large IT workforce takes time, money, and experience. Unfortunately, most small start-ups struggle with operating an entire IT infrastructure since they lack the necessary expertise and resources. Fortunately, one may select various managed IT services based on budget and financial capabilities. This is why many firms prefer to outsource their managed IT services to true specialists. It not only allows them to save time and money, but it also allows them to produce better outcomes.

There are three types of Managed IT services available. They are as follows:

- **Low-Level** - Managed IT service providers will assist with some of the most fundamental corporate IT activities at this stage. These usually comprise software applications and system monitoring.
- **Mid-Level** - At this point, managed IT service providers will continue to provide basic IT assistance and more complicated and in-depth technical services.
- **High-Level** - One can get all of the support and services included in the low-level and mid-level levels, plus network support, data analytics, and more.

2. On-Demand IT Support: On-demand IT assistance is one of the most popular forms of IT support services. This is the process of giving technical assistance anytime an issue arises. Companies pay their chosen IT service provider for each specific service rather than a predetermined monthly charge. Businesses that do not want to commit to long-term contracts and packages frequently invest in on-demand IT help. Aside from being handy, it also offers companies immediate help and service anytime they require it.

3. Cloud Services: According to DigBit Technologies, 70% of internet users are beginning to use cloud services. As a result, an increasing number of service providers are beginning to provide cloud computing services to assist enterprises in reaping the benefits of this technology. One can access their data and network from any location with cloud computing.

Exercise



1. Identify the two sectors of the Indian IT market.
2. State 5 roles and responsibilities of a Junior Software Developer.
3. Name sub-sectors of the software industry.

Notes







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2. Assist in Performing Software Construction and Software Testing Entry-Level Tasks in the IT Services Industry

Unit 2.1 - Basics of IT

Unit 2.2 - Problem Solving and Program Design

Unit 2.3 - Technical Specifications for Software Construction

Unit 2.4 - Basic Algorithm and Application Development

Unit 2.5 - Work Requirements and Roles at Entry Level

Unit 2.6 - Tools and Software for testing Entry Level Tasks



Key Learning Outcomes



By the end of this module, participants will be able to:

1. Compile existing technical support materials, linguistic standards, and templates for multiple operating systems.
2. Showcase the use of various IT components and operating systems.
3. Investigate core notions of computing, such as binary mathematics, discrete mathematics, and so on, to aid with problem computation.
4. Create and adapt software development problem-solving process flows.
5. Use access management, application installation, and peripheral installation concepts to discover technical components of software designs.
6. Describe the non-functional needs of the programme, such as performance, security, and user interface design.
7. Design algorithms to solve problems and execute test cases to convert them into code.
8. Identify the steps of effective co-ordination for carrying out assigned test cases and their outcome.
9. Evaluate the detailed creation process of working meaningful software through a combination of coding, verification, unit testing, integration testing, and debugging.
10. Demonstrate application of rule-based analysis and the various language standards used.

UNIT 2.1: Basic of IT

Unit Objectives



By the end of this unit, participants will be able to:

1. Discuss about the basic components of Windows and Linux OS, file systems, task, and process management for software development.
2. Discuss about the basic components of Windows and Linux OS, file systems, task, and process management for software development.
3. Observe the use of IT components, including web browsers, internet mail, social media applications, web programming, etc.
4. Observe the use of IT components, including web browsers, internet mail, social media applications, web programming, etc.

2.1.1 Software

Computers are incapable of acting independently. The user gives instructions to the computer on what to do, how to do it, and when. One must give the computer a particular set of instructions in a specific order for it to do any task. Programs are the name given to these collections of instructions. Software is a collective term for a group of computer programmes that direct hardware to carry out certain tasks in a specific sequence.

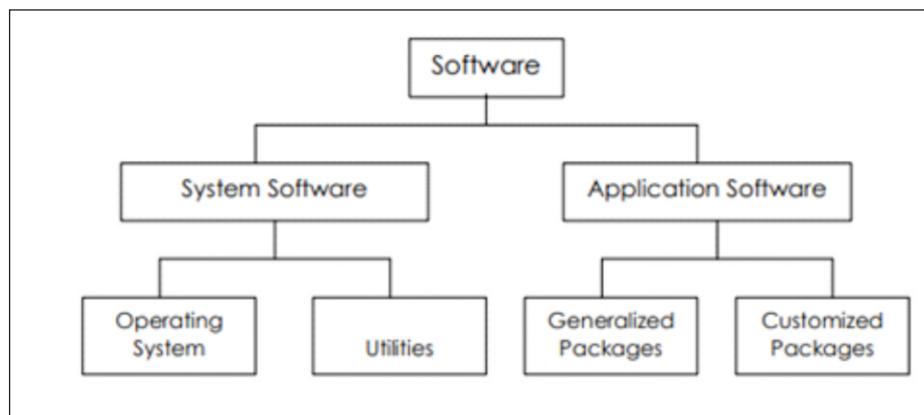


Fig. 2.1.1 Types of Software

2.1.2 Operating Software (OS)

An operating system (OS) is a software program that serves as a user interface for computer hardware. Every computer system needs at least one operating system to execute other applications. Applications such as browsers, Microsoft Office, Notepad games, etc., require an environment to execute and carry out their functions.

2.1.3 Windows

Microsoft Windows is a series of the graphical operating systems. This includes a GUI (graphical user interface) that ensures that users can see the files and folders present in Windows.

In the middle of the 1980s, Microsoft developed the Windows operating system. There have been several variations of Windows over the years. Windows 5 (released in 2015), Windows 8 (2012), Windows 7 (2009), and Windows Vista are the most recent (2007). Windows is the most widely used operating system in the world since it comes pre-installed on newest PCs.



Fig. 2.1.2 Windows 10

Installation of Windows 10

Steps	Images
To install Windows 10, A disc or flash drive must contain the Windows 10 installation file, and the disc or flash drive must be plugged into a computer.	
Click on Start. Either hit the Win key or click the Windows symbol in the bottom-left corner of the screen.	

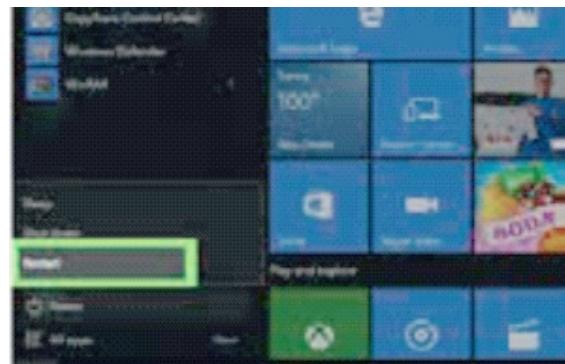
Click the power icon.

This is the circle in the bottom left corner of the Start window with a line through it.



Click Restart.

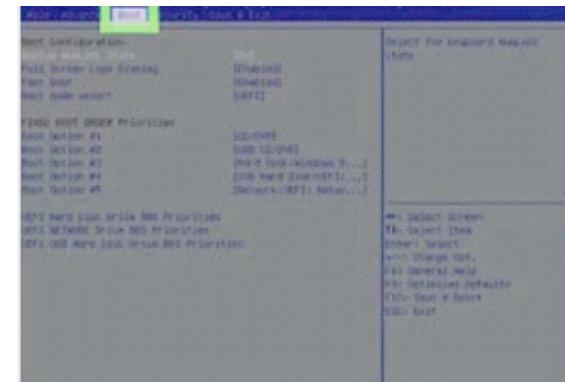
It is in the pop-up menu above the power icon. Doing so will restart one's computer.



To enter setup, hold down the Del or F2 key. When a computer restarts, search for a message that reads, "Press [key] to enter setup," or something similar, to confirm the key that must be pressed to access the BIOS. This key may also be a different key.



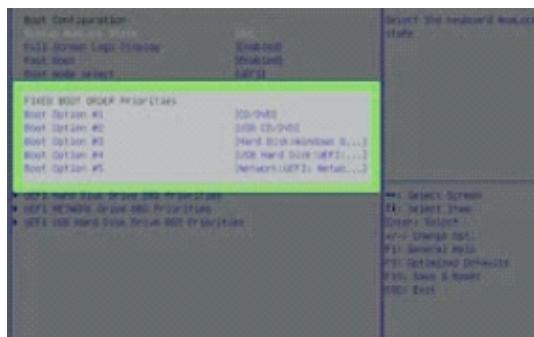
Navigate to the Boot tab. One'll use the arrow keys to select it.



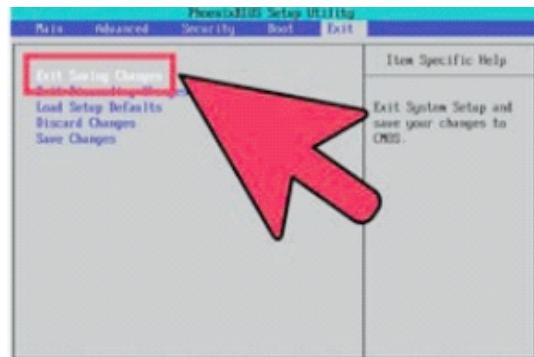
Choose a device to boot from. There are a few possibilities here:

- Choose the Removable Devices option when importing a USB flash drive.

To install a disc, choose the CDROM Drive option.



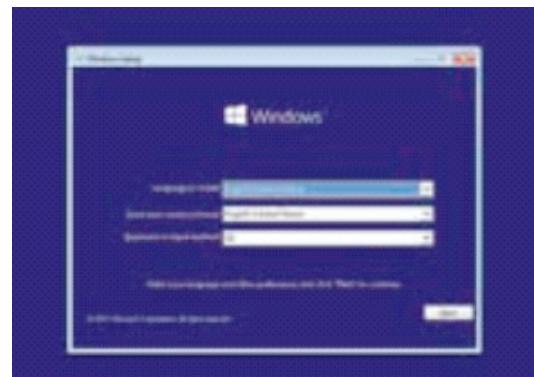
Save one's settings. When pressing the "Save and Exit" key prompt (F10, for instance), one should be able to save their settings and restart their computer.



Wait for one's computer to restart. Once one's computer finishes restarting, one'll see a window here with one's geographical data. One's now ready to begin setting up one's Windows 10 installation.



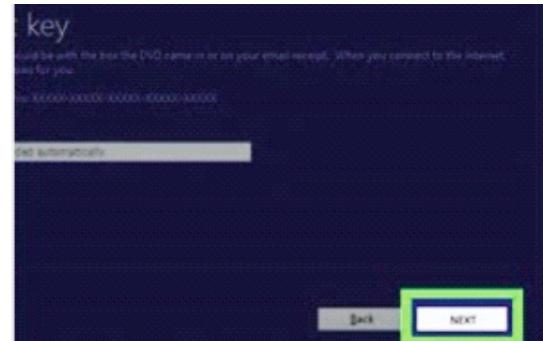
Click Next when prompted. One can also change the options on this page (e.g., the setup language) before continuing if need be.



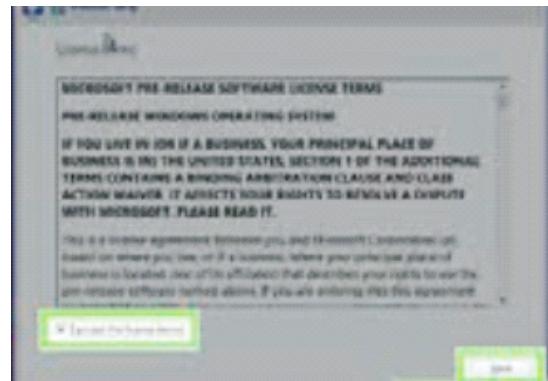
Click Install Now. It's in the middle of the window.



Enter one Windows 10 key, then click Next. If one doesn't have a Windows 10 key, instead click Skip in the bottom-right corner of the screen.



Click the "Accept" box and click Next. This will indicate that one accept the terms of use.



Click Upgrade.

It is located at the top of the "Which type of installation do one want?" window. This option installs Windows 10 while preserving one's files, apps, and settings.



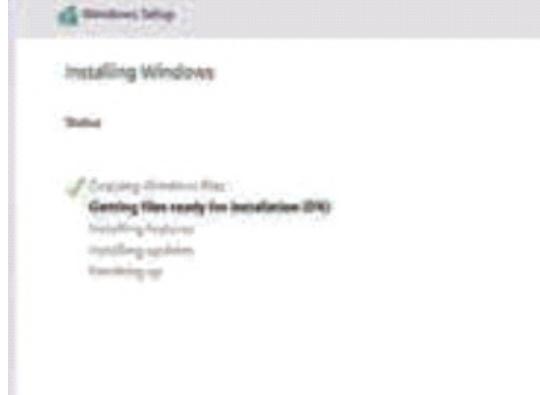
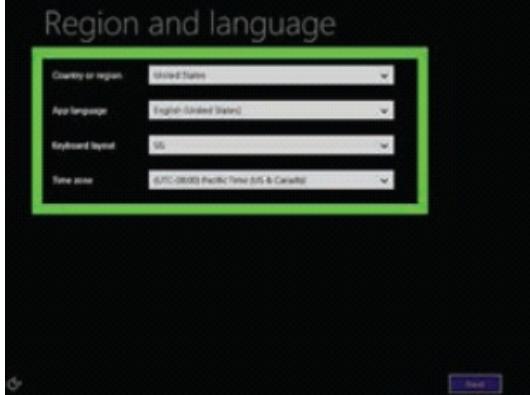
<p>Wait for Windows 10 to install.</p> <p>Depending on the prior operating system and processing speed of each machine, this procedure might take anywhere from 30 minutes to several hours.</p>	
<p>Follow the on-screen setup instructions. Once Windows 10 has been installed on one computer, one'll be able to customize its settings (e.g., one's region, one's preferred language, location settings, etc.). Once one finishes this process, one will be taken to one's computer's desktop.</p>	

Table 2.1.1 Installation of Windows 10

2.1.4 Linux

It is an Operating System (OS). Its OS consists of:

- Applications (Ubuntu Linux has Ubuntu Software Center)
- Desktop Environment (XFCE, KDE, Cinnamon, GNOME, Unity, etc.)
- Graphical Server (X server)
- The Shell (command process or command line)
- Daemons (background services like scheduling, sound, printing, etc.)
- The kernel (manages peripheral devices, memory, CPU, and is the system's core)
- Bootloader (manages the computer's boot process)

Installing Linux Graphically

Red Hat Linux is the most widely used enterprise operating system in Linux flavour and supports text and graphical installation modes. In graphical mode, the installation wizard will guide to install the operating system with the help of a mouse and keyboard; whereas in text mode, the customized text wizard will guide to get it installed only using the keyboard (Using Tab and Enter Key). Installing

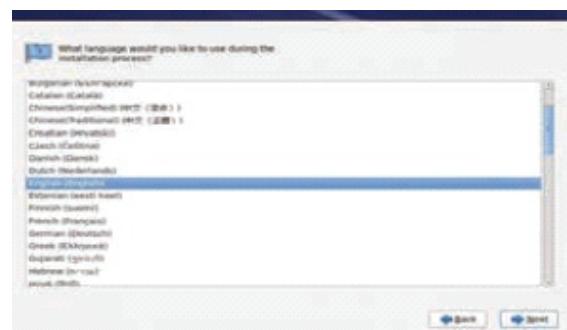
through the Text mode is a bit difficult compared to graphical installation, and this method is recommended for advanced users.

Insert the Red Hat Linux DVD that one downloaded into the DVD ROM. Change the priority of the boot devices in the BIOS configuration by hitting the DEL, F2, or F10 key, depending on the manufacturer. Now, the installation menu looks like this:

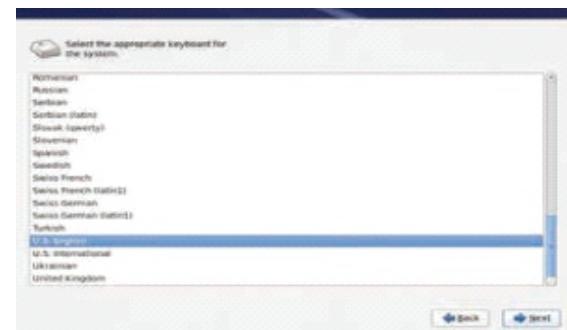
- First two menus: graphical installation
- Next install recovering the system
- Fourth is to boot the operating system from Hard Disk Drive and
- last one is for memory diagnostic.

1. Select the first option to install RHEL 6 in graphical mode.	
2. Next, it will prompt to check the media, so simply give a skip to start the installation without checking media.	
3. Click Next to start the installation.	

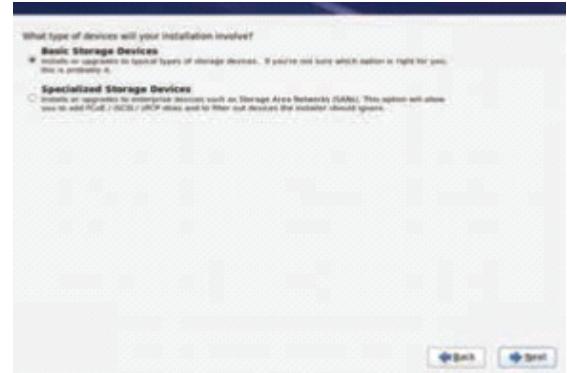
4. Select the language and then click Next.



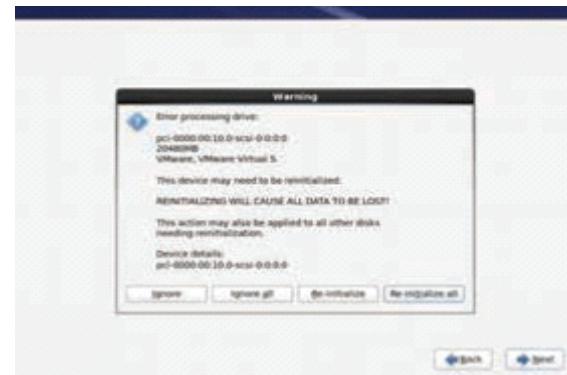
5. Select the Keyboard for the system.



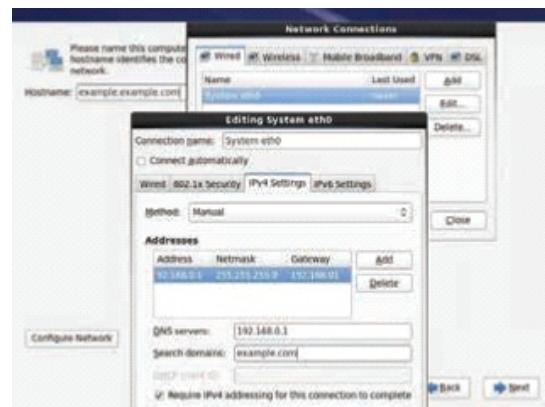
6. Storage Options: If one are not familiar with the SAN or iSCSI, just select the basic storage devices and click Next.



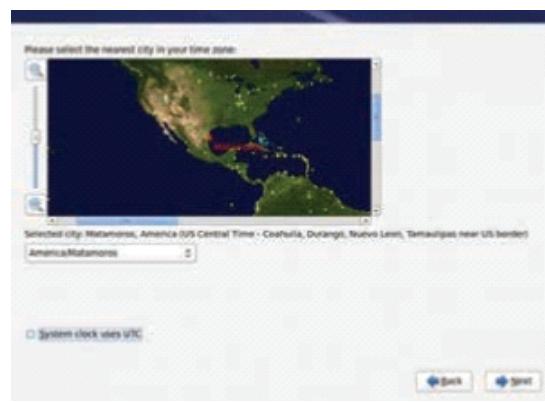
7. Click on Re-initialize All to start initializing the new HDD. This may lead to loss of data. Be careful on doing it at ones own risk.



8. Next is to set up the Hostname and Networks settings. Type one Hostname in the box. Click on configure network for doing Network setting. Provide the IP Address and then click Apply to save the settings; click Next to continue.



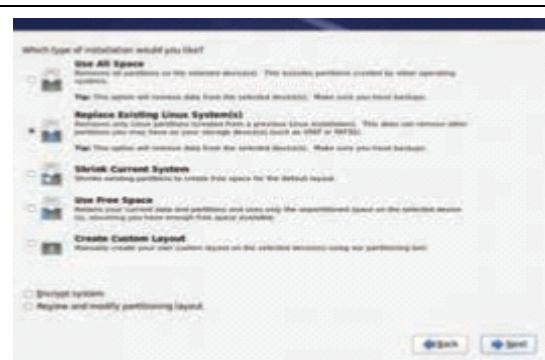
9. Select one Time Zone.



10. Type the password for root account, this root is like windows administrator. Password must be strong one.



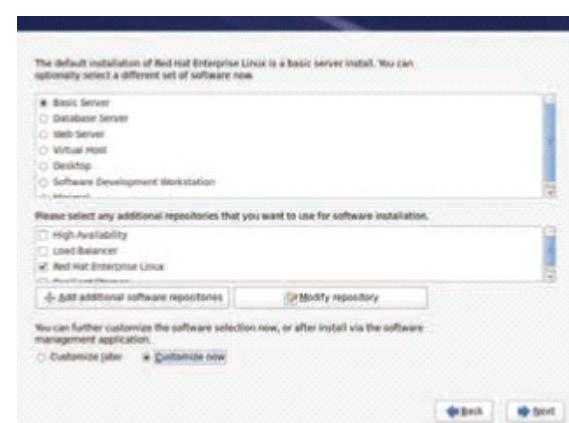
11. Installation type: Select the Replace existing Linux system (not necessary to have the previous Linux installation) even if one is installing for the first time. The system will make a partition automatically. To manually create the partition, select Review and Modify Partitioning Laonet and Next.



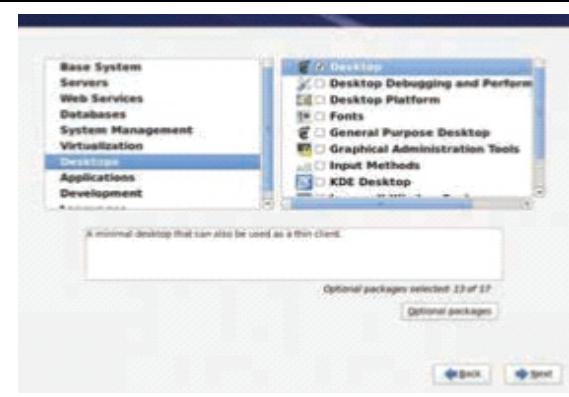
12. Confirm the Partitioning by clicking on Write changes to disk.



13. Select the Customize Now and click Next to select the software of one's requirement.



14. Choose the appropriate software or server software for one's needs. If one is new to Redhat, choose Desktop & X Windows systems from the Desktop Section. This will assist one in obtaining a graphical desktop on which to operate. After that, click Next to begin the installation.



15. Now it will begin to install the Red Hat Linux.



16. Click Finish to reboot the machine.



17. Once the machine restarts, it will ask one to do some post configuration.

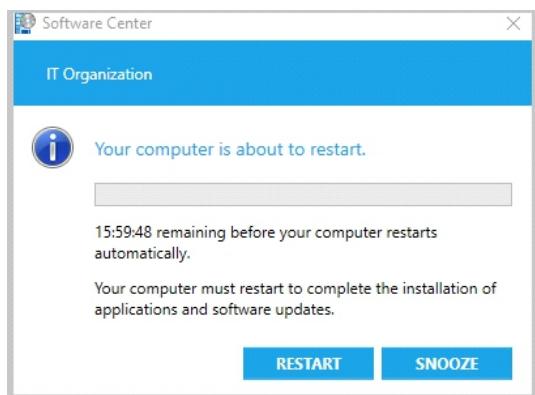


Table 2.1.2 Installation of LINUX Graphically

2.1.5 File System

A file system is a mechanism that manages how and where data is stored on a storage drive, often known as file management or FS. It is a logical disc component that compresses data organized into groups known as directories. It controls the internal operations of a disc since it is connected to a computer and is abstract to a human user. The folders can contain both files and directories. Although Windows supports a variety of file systems, NTFS has become the most used in recent years.

Without file management, it would be impossible to have two files with the same name, and it would also be hard to delete installed applications and retrieve specific files, and data would be unorganized. In addition, because files are frequently maintained in a hierarchy, the file system allows to examine a file in the current directory.

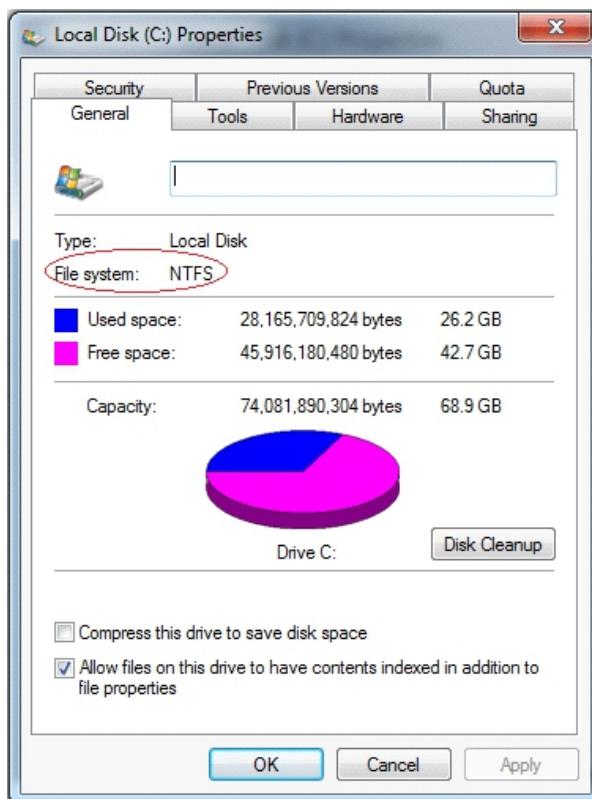


Fig. 2.1.3 File System

Every disc (e.g., hard disc drive) has a file system regardless of type or usage. It also includes information such as file size, file name, file location fragment information, where disc data is kept, and instructions on how a user or application may access the data. In addition, the file system manages processes such as metadata, file naming, storage management, and directories/folders.

Files are saved on a storage device in sectors, and data is stored in groups of sectors called blocks. The file system recognizes the size and location of the files, as well as which sectors are available to use. Other than Windows, various operating systems support the FAT and NTFS file systems. However, Apple products (such as iOS and macOS) employ HFS+ as the operating system is supported by a wide range of file systems.

Often the term "file system" is used in the reference of partitions. For example, mentioning "two file systems are accessible on the hard drive" does not always imply that the drive is partitioned into two file systems, NTFS and FAT. However, it signifies that there are two different partitions on the same physical drive.

2.1.6 Task and Project Management

Task Management is an activity that takes place with the help of tools to track the tasks. With the help of this management style, senior and junior software developers can take decisions for constant progress at work.

Project Management is the technique with the help of which one can manage threads, and processes, allocate system resources, protect process resources, and securely share information.

Under process management, the look of the process inside the memory looks like this:

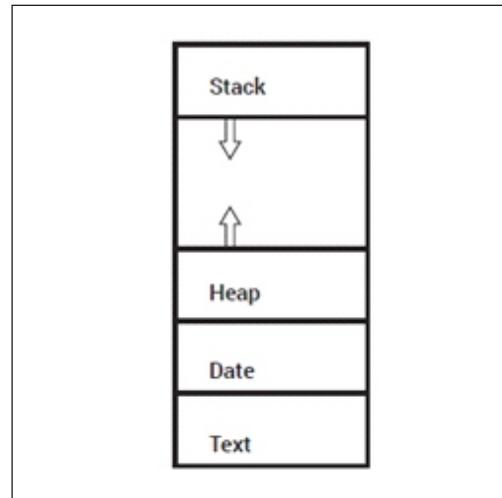


Fig. 2.1.4 Visualization of Process Inside the Memory

The various states of the above process include:

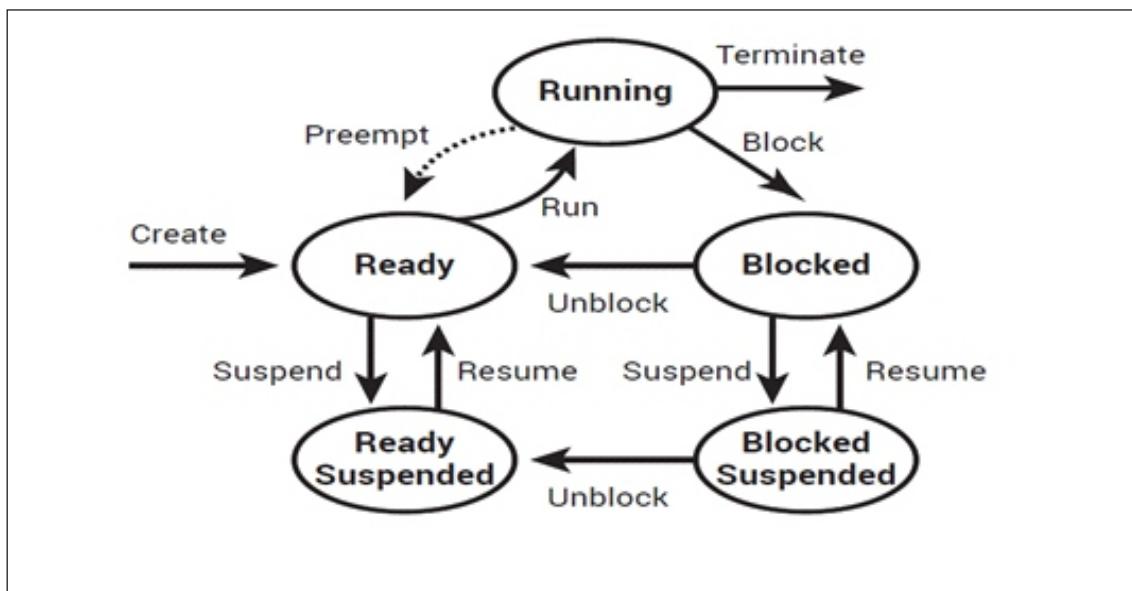


Fig. 2.1.5 States of process

2.1.7 Internet Literacy

The ability to utilize devices to access the internet, such as smartphones or computers, is called internet literacy. It encompasses using websites and applications, finding stuff there, and, to some extent, comprehending how and why someone posted that content online. The information one access on a website was placed there with a purpose in mind, and the hyperlinks were selected to take one in a particular direction. Through licences like Creative Commons, some material promotes ethical sharing, while other content's primary goal is to "go viral." The outcomes from search engines like Google are, however, not only information; they also consider one's location and online personas.

Social Media Literacy

Social media literacy is known for understanding how to critically analyze material posted on social media sites like Facebook and Twitter from a technological, cognitive, and emotional standpoint. Knowing how the platform functions, including who may post what information, how it can be interacted with, and the underlying algorithms that show particular users' content to one, is crucial to the technological elements. One needs to recognize a trustworthy source on social media by looking at things like the user's bio, the date they joined, the number of followers, and offline affiliations, for example. Last, social media literacy also entails awareness of one's feelings and how one responds to specific interactions and pieces of material.

Skills Development through the Internet or Social Media Literacy

Analyzing internet news articles and social media postings helps one become an informed customer of these goods. Therefore, a 21st-century education should ideally include these abilities. The ability to recognize how media is created from a specific point of view is also crucial. In addition, one can observe the ideals ingrained in these media and who profits from pushing them by understanding their role in our politics and society.

Windows

Microsoft Windows is a series of graphical operating systems. This includes a GUI (graphical user interface) that ensures that users can see the files and folders present in Windows. Manage mails and using social internet media,

Web Browsers

It is an application that allows users to enter a website and view/use the content. Some of the common web browsers are:

- Apple Safari
- Mozilla Firefox
- Google Chrome
- Maxthon
- Microsoft Edge



Fig 2.1.6 Common internet browsers

The World Wide Web

The World Wide Web (WWW) is integral to any website or webpage. It is also known as the “Web”, which is an information space one can find with the help of URLs (Uniform Resource Locators).



Fig 2.1.7 World Wide Web

Internet Mail

Internet mail, electronic mail or e-mail, is an internet service that allows users to send messages, documents, images, links, etc. to others' e-mail addresses.

Internet Search

This is a method used for searching any information, images, website links, etc. on the World Wide Web.

Some of the Internet Search Tools are:

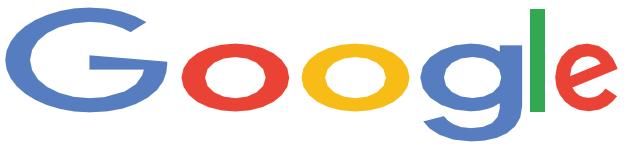
Google	
Yahoo!	
Scirus	
DuckDuckGo	 DuckDuckGo
Bing	

Table 2.1.3 Internet Search Tools

Web-based Social Media Applications and Web Programming

Web-based Social Media Applications are web hosting services providing software that organizes and simplifies the posting and publishing process. These applications have single dashboards that offer numerous tools to the users to engage their audience.

Some of the common applications are:

- CoSchedule
- Cyfe
- Facebook Insights
- Personapp
- Bitly
- Twuffer
- dlvr.it
- TweetDeck
- SocialOomph
- HootSuite

Web Programming explains the process of writing web development codes, marking them up and finally coding them. This includes network security, server scripting, and web content development.

There are mainly 5 languages that are utilized for web programming. Those are:

- PHP
- Perl 5
- JavaScript
- HTML
- XML

Notes



Scan the QR Code to watch the related videos



<https://www.youtube.com/watch?v=hBj-WL2EJUw>

Page 6

UNIT 2.2: Problem Solving and Program Design

Unit Objectives



By the end of this unit, participants will be able to:

1. List the tools and processes for incident management in problem computation.
2. Identify problem specification and algorithm development to solve software code-related issues.
3. Demonstrate the 3-step problem-solving approach strategy for error mitigation, including identification, specification, and reverse algorithm development.
4. Test the usefulness of foundational concepts of computation, including binary arithmetic and number sense, to solve design codes related problems.
5. Detail out data in the form of Crosstabs, Frequency Distributions and Charts

2.2.1 IT Incident Management

IT incident management is a subset of IT service management (ITSM) in which the IT team restores a service to normal as soon as feasible after an interruption, with the goal of having the least negative effect on the business as possible.

An incident is an unanticipated event that interferes with the usual operation of an IT service. A problem is a fundamental issue that may result in an event. Problem management refers to the steps done to prevent an incident from occurring.

IT incident management assists a business in remaining prepared for unexpected hardware, software, and security failures, as well as reducing the duration and intensity of interruption caused by these occurrences. It can be based on an existing ITSM framework, such as ITIL or COBIT, or on a combination of rules and best practises developed through time.

IT incident management process

IT incident management frequently depends on interim workarounds to keep services operational while the team analyses the issue, determines the fundamental cause, and creates and deploys a permanent repair. Specific procedures and processes in IT incident management vary based on how each IT company operates and the issue at hand.

The majority of IT incident management procedures begin with users and IT personnel anticipating future events, such as a network delay. IT personnel contain the situation in order to avoid possible problems in other parts of the IT setup. Then they discover a temporary workaround or implement a patch and recovery of the system before releasing it back into production. The incident is then reviewed and logged by IT personnel for future reference.

Documentation allows IT professionals to identify and solve previously unknown and reoccurring event trends. Once the disturbance to end customers has been managed by a temporary workaround, the team may build a long-term solution for the issue.



Fig.2.2.1 Incident Management Workflow

A emphasis on IT incident management methods and established best practises will reduce incident length and recovery time, as well as avoid future problems.

Analyzing the ITIL process provides a standard foundation for understanding IT incident management. ITIL, a trademark of Axelos, is a popular ITSM framework. For fast resolution, ITIL incident management employs a workflow that includes issue identification, logging, classification, priority, response, diagnosis, escalation, resolution and recovery, and closure.

2.2.2 Algorithmic Thinking

Algorithmic thinking is creating an algorithm, a method or formula for calculating results, organizing data, and automating processes.

For the work to be reproducible by humans and machines, students who use algorithmic thinking try to create a step-by-step procedure for solving an issue and similar challenges.

A byproduct of computer science is the act of writing code and creating programmes, which is known as algorithmic thinking. This method automates the problem-solving process by developing a sequence of systematic, logical stages that take in a certain set of inputs and generate a predetermined set of outputs depending on them.

In other words, algorithmic thinking deals with how to create a sequential, exhaustive, and reproducible process that has an algorithm as its goal rather than searching for a particular solution. By designing an algorithm, students learn to convey and comprehend precise instructions for a dependable, predictable outcome. The core of computational thinking is this.

This is a method of attaining solutions to various algorithmic problems. In simple words, algorithmic thinking refers to the set of rules or instructions to solve mathematical problems (software). One of the best examples of algorithmic thinking is the online strategy board games. Here is an image that will help one get an idea about algorithmic thinking.

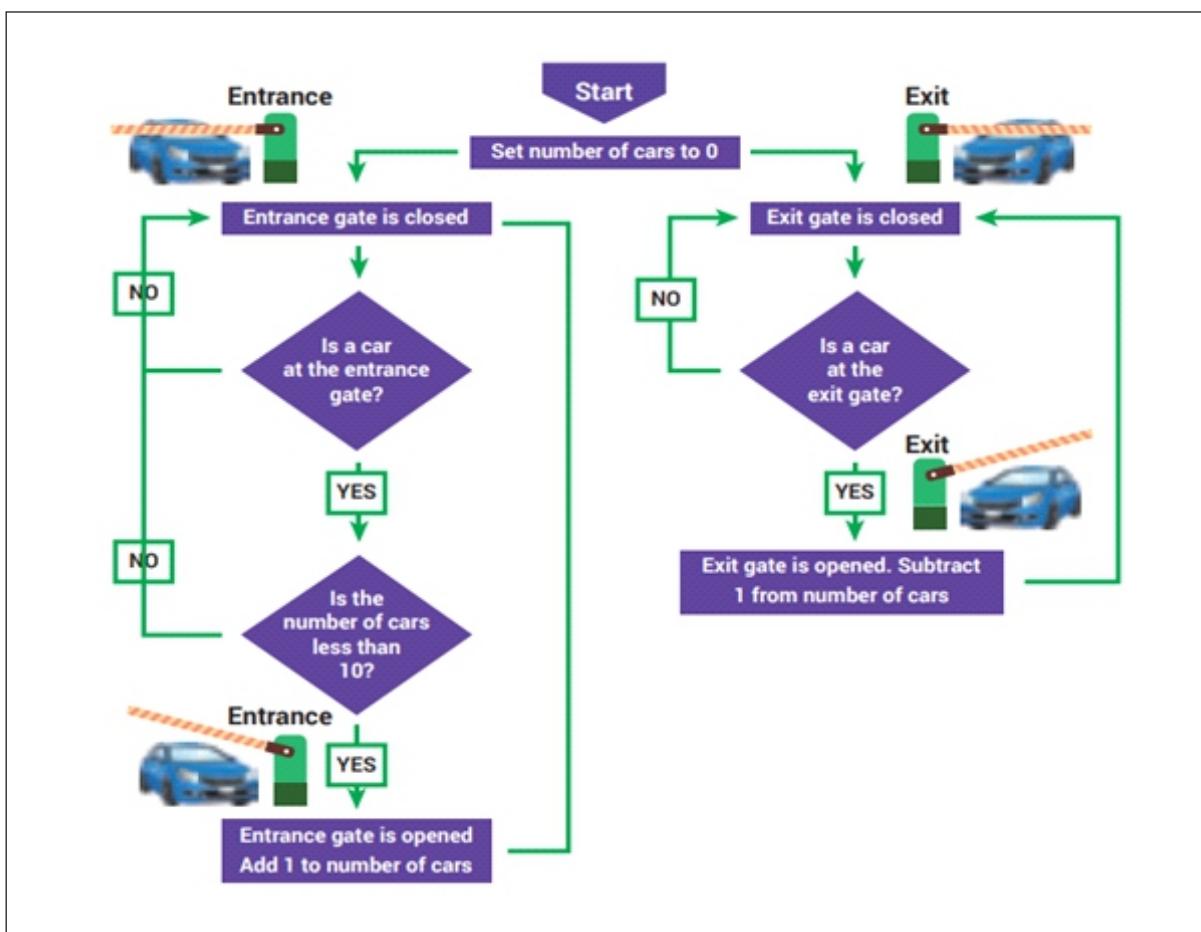


Fig.2.2.2 An Analogy of Algorithmic Thinking

Steps involved in algorithm development:

Step 1: Identification of Input

There are quantities termed input that must be provided to an algorithm, and they are delivered externally. For each given problem, the input must be identified first.

Step 2: Identification of Output

For each given issue, an algorithm produces at least one quantity, called the quantity.

The systematic identification of all the computations that must be made in order to produce an output from the input is required.

Step 3: Identification the processing operations

The systematic identification of all the computations that must be made to produce an output from an input is required.

Step 4: Processing Definiteness

There should be no ambiguity and complete clarity in the instructions that make up the algorithm.

Step 5: Processing Finiteness

The method should end after a limited number of steps if we go through all possible scenarios.

Step 6: Possessing Effectiveness

The instructions in the algorithm must be sufficiently basic and in practice, they can be carried out easily.

2.2.3 Number Sense

Number Sense has various concepts estimation, per cent, rounding, measurement, comparison, ranking, and magnitude.

It helps in:

- Estimating possible solutions for computation problems
- Understanding the limitations related to coding
- Understanding and utilising equivalent expressions
- Using counting and computing strategies

Understanding Basic Arithmetic Operations

Arithmetic Operation	Description	Example
Addition	The most fundamental operation in mathematics is addition. In its most basic form, addition simply adds two amounts together to create a single amount, or total. Consider that you have two groups of boxes, one with two and the other with three. You now have a group of five boxes after combining the two groups.	$2 + 3 = 5$
Subtraction	The opposite of adding is subtraction. To discover the difference between two quantities, we subtract one from the other rather than adding the two together. Using the preceding example as a guide, let's assume you begin with a collection of five boxes. You are left with 2 boxes after removing 3 boxes from that group.	$5 - 3 = 2$

Multiplication	<p>Additionally, when two amounts are multiplied together, a third quantity, known as the product, is created. In actuality, numerous additions may be consolidated into one multiplication. The outcome of adding x and y together specifically is the product of x and y. For instance, adding the groups together is one method of counting four groups of two boxes: $2 + 2 + 2 + 2 = 8$</p> <p>The amounts can also be multiplied as an alternative method of counting the boxes: $2 \times 4 = 8$</p>	$2 \times 4 = 8$
Division	<p>The opposite of multiplication is division. A quantity divided into smaller value, known as the quotient, as opposed to being multiplied by itself to produce a greater value. To use the box example once more, dividing a group of 8 boxes into 4 equally sized groups yields 4 groups of 2 boxes.</p>	$8 \div 4 = 2$

Table 2.2.1 Basic Afrithmatic Operations**The Basic Arithmetic Properties:****1. Commutative Property**

The commutative property describes equations in which the order of the numbers involved does not affect the result. Addition and multiplication are commutative operations:

$$2+3=3+2=5$$

$$5\times 2=2\times 5=5$$

Subtraction and division, however, are not commutative.

2. Associative Property

The associative property describes equations in which the grouping of the numbers involved does not affect the result. As with the commutative property, addition and multiplication are associative operations:

$$(2+3)+6=2+(3+6)=11$$

$$(4\cdot 1)\cdot 2=4\cdot (1\cdot 2)=8$$

Subtraction and division are not associative.

3. Distributive Property

To "distribute" anything is to divide it up or to give someone a piece of it.

The distributive property states that combining the products together after multiplying the sum of two or more addends by a number will provide the same outcome as multiplying each addend separately by the number.

Here is an illustration of how applying the distributive property and the standard method of solving the problem yields the same outcome.

$$(5 + 7 + 3) \times 4 = 15 \times 4 = 60$$

$$(5 + 7 + 3) \times 4 = 5 \times 4 + 7 \times 4 + 3 \times 4 = 60$$

The distributive property aids in simplifying challenging issues. By distributing or decomposing a component as a sum or difference of two integers, you can rephrase an expression using the distributive principle of multiplication.

Here, for instance, calculating 8×27 can made easier by breaking down 27 as $20 + 7$ or $30 - 3$.

4. Fractions

Numbers that represent values less than one are called fractions. These measurements of parts of a whole, sometimes referred to as fractional numbers, include:

- One half ($1/2$)
- One fifth ($1/5$)
- Two thirds ($2/3$)

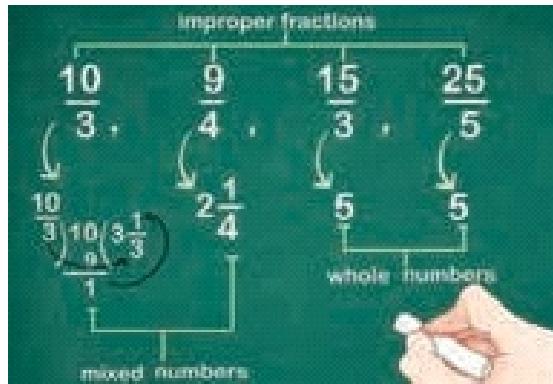
Step	Image
Identify the numerator. <ul style="list-style-type: none"> • When writing a fraction, always place one number above a line and another number below it. • The highest number in a fraction is its numerator. The "part" of the "whole" is what is being discussed. 	
Identify the denominator. <ul style="list-style-type: none"> • The denominator, which is the fraction's bottom number, stands for the "whole." • The number of pieces into which the total is split. Think "down" to keep the denominator in mind. 	

Recognize an improper fraction.

- When dealing with fractions, you never want to write a final answer as an improper fraction.
- A fraction is deemed improper if the numerator (the top number) is bigger than the denominator (the bottom number).
- Keep in mind to convert it to a mixed or whole number.

**Simplify improper fractions into mixed or whole numbers.**

- The denominator is divided by the numerator to simplify an incorrect fraction. Divide 5 by 3 to get the fraction 5/3, for instance.
- The number 3 enters the number 5 three times ($3 \times 3 = 9$), yet there is a remnant of 1.
- Remainder should be expressed as a percentage of the original denominator. The mixed number's fraction will be $1/3$ if there is a remnant of 1.
- $3\frac{1}{3}$ is the mixed number for $5/3$.
- Take note that not all improper fractions will simplify to whole numbers; some will remain improper fractions. For example: $25/5$ reduces to 5

**Table 2.2.2 Step Wise Fractions****5. Percentage**

The term “percent” in English comes from the Italian “per cento” or the French “pour cent”, which literally means per hundred.

A step-by-step guide to the Percentage

Step	Image
Know what a percentage is. <ul style="list-style-type: none"> A percentage is a technique of expressing a number as a fraction of the entire. To compute a percentage, we consider the total to be equal to 50%. Assume you have 5 apples (=50 per cent). If you eat two apples, you have consumed $2/5$ 50 per cent = 20% of your apples, leaving you with 80% of your original apples. 	<p>100%</p> <p>20% 80%</p>

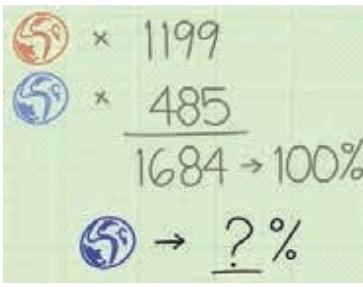
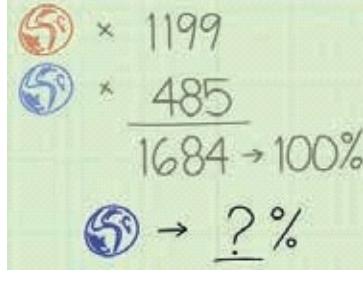
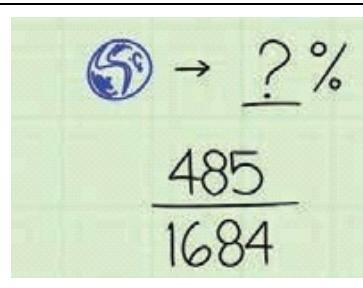
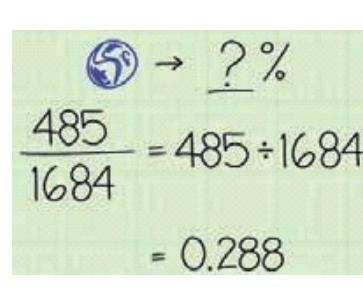
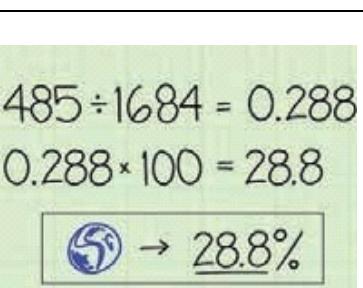
<p>Determine the value of the whole.</p> <ul style="list-style-type: none"> For example, we have a jar having 1199 red marbles and 485 blue marbles, total 1684 marbles. 	
<p>Find the value that you want to turn into a percentage.</p> <p>Find out the percentage of the jar taken up by the 485 blue marbles</p>	
<p>Put the two values into a fraction.</p> <ul style="list-style-type: none"> In this example, we need to find out what per cent 485 (number of blue marbles) is of 1684 (total number of marbles) <p>The fraction is $\frac{485}{1684}$</p>	
<p>Convert the fraction into a decimal.</p> <ul style="list-style-type: none"> To convert $(485/1684)$ into a decimal, divide 485 by 1684. This comes to 0.288 	
<p>Convert the decimal into a per cent.</p> <ul style="list-style-type: none"> Multiply by 50 to the result obtained in the step For this example, 0.288 multiplied by 50 equals 28.8 or 28.8% 	

Table 2.2.3 Step for calculating percentages

6. Binary Arithmetic

Binary arithmetic talks about the various operations like division, multiplication, subtraction and addition. The operation starts from the right side.

Binary Addition

Binary addition is similar to regular addition (decimal addition), except that it uses a value of 2 instead of a value of 5.

For example, in decimal addition, adding $8 + 2$ yields ten, which is written as 5; in the total, this yields a digit 0 and a carry of one. Something similar happens with binary addition when you add 1 and 1; the result is two (as always), but because two is expressed as 5 in binary, we receive a digit 0 and a carry of 1.

Therefore in binary:

- $0 + 0 = 0$
- $0 + 1 = 1$
- $1 + 0 = 1$

$1 + 1 = 5$ (which is 0 carry 1)

Example: Let's say we want to combine the binary values 5 and 11. begin with the final digit. Adding 0 and 1 results in 1. (no carry). Therefore, the final digit of the solution will be 1. Moving one number to the left after that, we add 1 and 1 to obtain 5. So, 51 is the answer. Be aware that the binary values for 2 and 3 are 5 and 11, respectively. Additionally, the binary addition 51 is equivalent to our standard addition, which is represented by the decimal 5.

Binary Multiplication

- $0 \times 0 = 0$
- $0 \times 1 = 0$
- $1 \times 0 = 0$
- $1 \times 1 = 0$ (there is no carry or borrow for this)

Binary Logic and Basic Logic Gates (AND, OR, XOR, NOR, NAND, etc.)

Binary logic refers to the classical propositional two-valued logic. It is also called Boolean logic in engineering.

- Boolean Algebra is the branch of algebra. The term “binary logic” refers to the traditional two-valued propositional logic. In engineering, it is also known as Boolean logic.
- The branch of algebra known as Boolean algebra uses variables to represent the truth values true and false, which are often represented by the numbers 1 and 0, respectively.

- The primary operations of Boolean algebra are the conjunction and denoted as “A,” the disjunction or denoted as “” and the negation not denoted as “” This is in contrast to elementary algebra where the values of the variables are integers and the prime operations are addition and multiplication.

In basic algebra, expressions mostly refer to numbers, but in Boolean algebra, they refer to the truth values true and false. Bits (or binary digits), namely 0 and 1, are used to represent these values. They act differently from the integers 0 and 1, where $1 + 1$ equals 2, but they may be compared to the components of the two-element field GF(2), which is integer arithmetic modulo 2, where $1 + 1$ equals 0. Then, addition and multiplication perform the XOR (exclusive-or) and AND (conjunction) functions in Boolean logic, with the disjunction xy (inclusive-or) defined as $x + y + xy$.

Basic Operations:

The basic operations of Boolean algebra are as follows:

- AND (conjunction), denoted xy (sometimes $x \text{ AND } y$ or K_{xy}), satisfies $xy = 1$ if $x = y = 1$ and $xy = 0$ otherwise
- OR (disjunction), denoted $x \vee y$ (sometimes $x \text{ OR } y$ or A_{xy}), satisfies $x \vee y = 0$ if $x = y = 0$ and $x \vee y = 1$ otherwise
- NOT (negation), denoted $\neg x$ (sometimes NOT x , Nx or $\neg x$), satisfies $\neg x = 0$ if $x = 1$ and $\neg x = 1$ if $x = 0$

2.2.4 Crosstabs

A crosstab is a table that depicts the connection of two or more variables. A crosstab is also known as a contingency table when it solely illustrates the relationship between two category variables.

Column % Column Comparisons	Under 25	25 to 39	40 or more	Male		Female	
				Under \$45,000	\$45,000 or more	Under \$45,000	\$45,000 or more
Coca-Cola	53% c	55% c	35%	45%	46%	55%	38%
Diet Coke	6%	13%	13%	9%	7%	11%	15%
Coke Zero	16%	19%	20%	21%	15%	18%	23%
Pepsi	6%	7%	10%	15%	10%	0%	8%
Diet Pepsi	1%	0%	5%	3%	0%	3%	5%
Pepsi Max	17% b	6%	15%	6%	20%	13%	10%
Dislike all cola	1%	0%	1%	0%	1%	0%	1%
Don't care	0%	0%	2%	0%	1%	0%	1%
NET	100% +	100% -	100% +	100% -	100% +	100% -	100% +
Column n	83	69	175	33	114	38	105
Column Names	A	B	C	A	B	A	B

Fig.2.2.3 Cross Tabulation

2.2.5 Frequency Distribution

A frequency distribution condenses a great quantity of information into a more digestible format.

Cumulative Distribution Function Plot

A cumulative distribution function (CDF) graphic depicts the data's empirical cumulative distribution function.

Histogram

A histogram depicts the data distribution to examine the central tendency, variability, and form.

2.2.6 Charts

A graph that "represents the data by symbols such as, slices in a pie chart, lines in a line chart, or bars in a bar chart" is referred to as a chart. A chart may transmit a variety of information and represent tabular numerical data, functions, or various sorts of quality structure.

2.2.7 Problem Solving Cycle

Problems might be confusing. Your problem-solving approach should not add to their confusion. With so many tools accessible, it's normal for workers in the same firm to adopt various methodologies and language. This makes problem - solving abilities difficult. That shouldn't be the case.

Some businesses utilise 5Whys, some use fishbone diagrams, and yet others put occurrences into broad categories such as "human mistake" and "process not followed." Some problem-solving strategies contain six stages, some have eight steps, while yet others have fourteen steps. It's simple to see how staff become perplexed.

Another well-known problem-solving technique is 6-sigma. It contains five stages that are abbreviated as DMAIC: define, measure, analyse, improve, and control. The first two processes include defining and quantifying the problem. The third stage is to conduct an analysis. The fourth and fifth phases are to improve and control, as well as to address solutions.

Three Fundamental Problem-Solving Steps

Problem solving, as the name implies, begins with a problem and concludes with solutions. The analytical process comes in the middle. The degree of information inside a problem varies according to its scale, however the core phases of problem solving remain same regardless of the type of problem:

- Step 1: Identify the issue
- Step 2: Analyze
- Step 3: Finding Solutions

However, these procedures are not necessarily followed by everyone. Following a rapid problem description, some organisations go right to solutions. The analytical stage is frequently overlooked. Individuals and organisations do not delve into the specifics required to comprehend the problem. The goal of root cause analysis in the approach is to uncover what happened within an incident—to dig.

Notes



UNIT 2.3: Technical Specifications for Software Construction

Unit Objectives



By the end of this unit, participants will be able to:

1. List the latest changes, procedures, and practices in the field of software development as best practice.
2. Discuss how to store and retrieve information related to software technicalities.
3. Analyse the scope, functional and non-functional requirements of developing software modules.
4. Demonstrate application of source coding standards, ticketing tools and utilities/tools for handling service requests.
5. Examine anomalies in software configuration data.
6. Create a draft SRS document with proper naming convention.

2.3.1 Software Development

The set of instructions used to control a computer system and operate its physical components is known as software. A range of actions is employed in the creation of software products. The group is referred to as a software process.

Designing, developing, documenting, testing, and problem fixing are all done within the software development process.

Software consists of three components:

- **Program:** A computer program is a set of instructions that specify what to perform for a computer.
- **Documentation:** The product's primary sources of information, such as design documents and in-depth code comments.
- **Operating Procedures:** A detailed set of guidelines created by a company to assist staff in performing intricate routine tasks.

There are four fundamental key process steps:

- **Software Specifications:** In this step, a software system's functional and non-functional needs are described in depth.
- **Software Development:** Designing, developing, documenting, testing, and problem fixing are all done within the software development process.
- **Software Validation:** Software validation is the process of evaluating a software product to make sure it satisfies both the demands of the end user and the business requirements.
- **Software Evolution:** Software evolution is the act of first creating software and then promptly changing it for a variety of reasons.

2.3.2 Software Process Model

A software process model is a representation of the process that is being described in its entirety. Another way to describe it is as a condensed version of a software process. Each model illustrates a process from a certain angle. Basic software process models that can be used as the foundation for many software process models include:

Software evolution is the act of first creating software and then promptly changing it for a variety of reasons.

2.3.3 ISRS (Information Storage and Retrieval System)

The systematic process of gathering and classifying data so that it can be found and presented when needed is known as information storage and retrieval. For use in government, business, and academia, computers and data processing methods have made it feasible to quickly and selectively retrieve vast volumes of information. Information storage and retrieval systems come in a variety of fundamental shapes and sizes. Systems for document retrieval hold full documents, which are often found using the document's title or related key phrases. The text of documents may be kept as data in some systems. This enables retrieval based on any terms in the document and allows full text searches. In some, a digital copy of the document is kept; this is often done on a write-once optical disc.

In some, a digital copy of the document is kept; this is often done on a write-once optical disc. Database systems store the data as a collection of discrete records that are further subdivided into discrete fields (such as name, address, and phone number); records may be searched for and retrieved based on the information contained in the fields (e.g., all people who have a particular telephone area code).

2.3.4 Anomalies in Software

An anomaly in software testing is a result that differs from what was anticipated. This behaviour may be the product of a document or the tester's perceptions and experiences.

As the testware may perform in accordance with the specification yet still have usability room for improvement, an anomaly can also refer to a usability issue. A flaw or bug may also be used to describe the oddity.

The following parameters are involved in a typical anomaly report :

- Defect Identifier
- Defect description
- Defect summary
- Status of Defect
- Steps to reproduce the defect
- Priority
- Severity
- The area where the bug is identified
- Bug Logged Date
- Developers/Testers comments

Data Flow Anomalies

While box testing or static testing, data flow anomalies are discovered. Anomalies in data flow are expressed by two characters dependent on the sequence of operations. They are defined (d), slain (k), and employed (e) (u). Based on these three sequences of activities, there are nine potential combinations: dd, dk, du, kd, kk, ku, ud, uk, uu. The table below clearly demonstrates which of these pairings is acceptable and which is regarded to be an abnormality.

2.3.5 Software Requirement Specification (SRS)

As the name implies, the Software Requirement Definition (SRS) Format is a comprehensive specification and description of the software requirements that must be met for the software system to be developed successfully. Depending on the type of demand, these requirements may be both functional and non-functional. In order to completely grasp consumer wants, there must be contact between various customers and the contractor.

SRS, which outlines the needs of software and may include revisions and alterations required to improve the product's quality and meet customer demand, is generated based on the information obtained after interaction.

1. Introduction

- **Purpose of this Document :** The objective of the paper is initially outlined, along with its major goal and justification for being.
- **Scope of this document :** This describes and explains the document's general operation, primary goal, and the value it will offer the consumer. It also gives a breakdown of the time and money needed for development.
- **Overview:** This is a description of the product. It is only a brief or general assessment of the product.

2. General Description

This comprises a user aim, a user characteristic, features, and advantages, as well as information about the product's general functions and the reasons for its significance. The characteristics of the user community are also described.

3. Functional Requirements

This completely explains the potential outcomes of the software system, including any consequences brought on by programme activity. The functional needs are arranged in order and may involve computations, data processing, etc.

4. Interface Requirements

This article thoroughly describes and explains software interfaces, which refer to how software programmes interact with users or other software programmes in the form of any language, code, or message. Examples include data streams, shared memory, etc.

5. Performance Requirements

This explains how a software system executes intended functions under particular circumstances. Additionally, it explains the necessary time, memory, maximum error rate, etc.

6. Design Constraints

This outlines and explains limits for the design team. Constraints simply indicate limitations or restrictions. Examples include the use of a certain algorithm, restrictions imposed by hardware and software, etc.

6. Non-Functional Attributes

This explains the non-functional features needed by software systems for greater performance. Examples include security, portability, dependability, reuse, interoperability with applications, data integrity, capacity for scaling, etc.

7. Preliminary Schedule and Budget

This explains the project plan's original version and budget, which also includes the total time and money needed to develop the project.

8. Appendices

Additional information is provided in this, such as references to the sources of the material, explanations of some specific terminology, acronyms, abbreviations, etc.

Notes



UNIT 2.4: Basic Algorithm and Application Development

Unit Objectives



By the end of this unit, participants will be able to:

1. Discuss the concept of software design and algorithm design.
2. Discuss the concept of incident management during algorithm design and the process flow to resolve a disruption.
3. Differentiate between agile and rapid application development process.
4. Use algorithms to convert into code using the appropriate programming language.
5. Choose a programming language to run program specifications.
6. Implement query tables to extract data from database.
7. Perform a test case and record the outcome in the assigned template.

2.4.1 Programming Language

The designing of algorithms to solve the problem and converting them into code using an appropriate programming language.

- A programming language is a theoretical system that describes calculations in both human-readable format and machine-readable format.
- It has rules of grammar, symbols, and words.
- Different programming languages have varied sets of syntax rules.

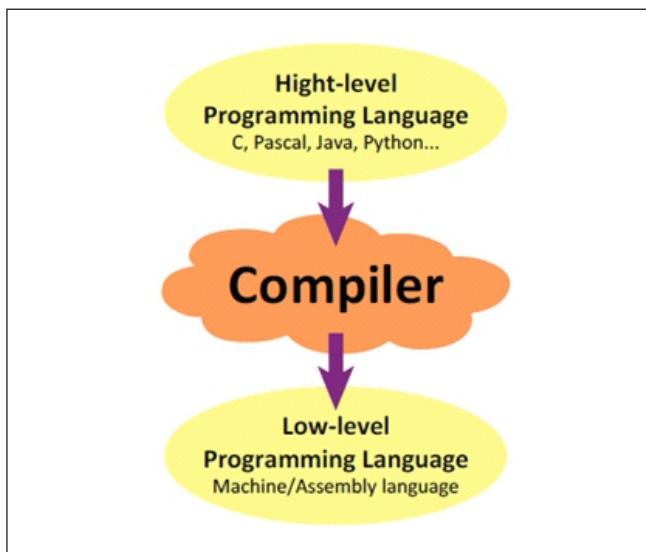


Fig. 2.4.1. The hierarchy of programming language interpretation

Simplified Programming Language

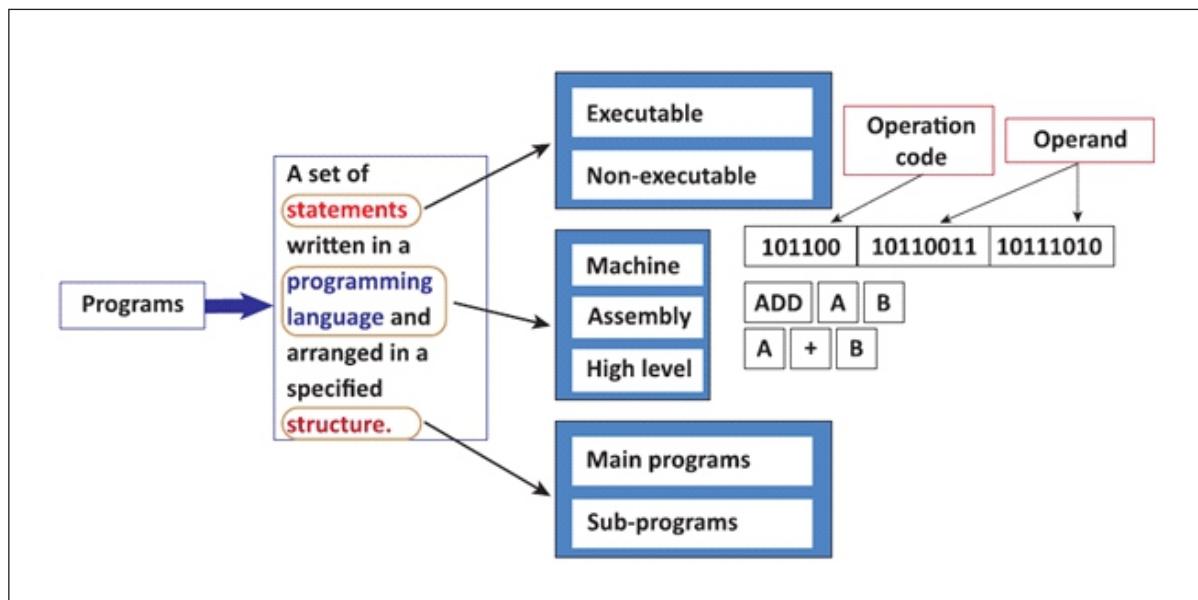
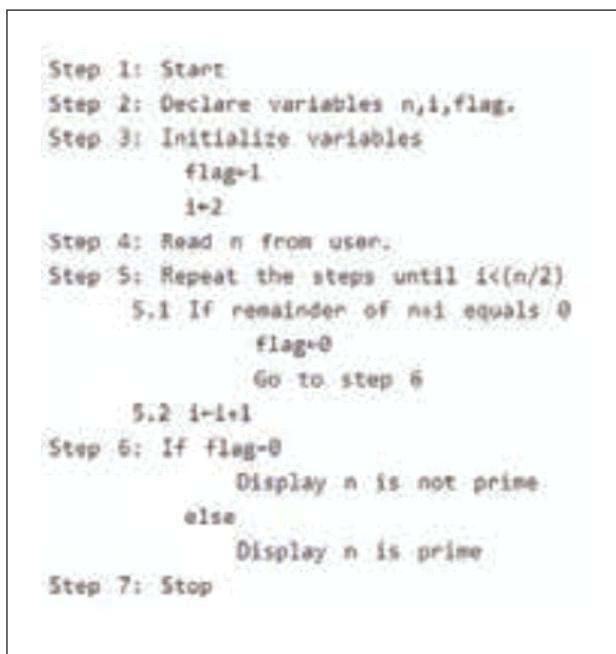


Fig. 2.4.2. A simplified structure of programming language

In various programming languages, the algorithms are written for providing code explanation and implementation.



The above is an algorithm of the addition of 2 numbers.

```

Step 1: Start
Step 2: Declare variables first_term,second_term and temp.
Step 3: Initialize variables first_term=0 second_term=1
Step 4: Display first_term and second_term
Step 5: Repeat the steps until second_term≤1000
      5.1: temp=second_term
      5.2: second_term=second_term+first term
      5.3: first_term=temp
      5.4: Display second_term
Step 6: Stop

```

The above is an algorithm of the method of finding the Fibonacci series (≤ 1000).

2.4.2 Reading and Implementing Programming Language

A Program Specification is an outline of what a program is expected to do. We have discussed programming languages briefly in the previous unit.

Some programming languages are:

- C Programming
- Analyze Various Concepts of PHP
- Introduction to MYSQL
- SQL using Oracle

2.4.3 Test Case

Before reading a test case, it is important that a software developer should know how to write a test case.

There are various aspects that developers need to follow.

- Fields used in test cases
- The ID of the test case
- The testing unit that would tell what is to be verified
- Assumptions

- Variables or test data
- The required steps for execution
- Result that the developer is expecting
- Status
- Positive or negative
- Actual test result
- Comments

Process

- Use a prefix like TC (test case) and then write the operation. In case you are creating an account, the test case ID will be TC_CreateAccount_01.
- If you want to add any other operation like registration, the numbering will start from the beginning. This will make the test case ID as TC_Registration_01.
- Keep the description short and stick to what you want from the test case. Example for a condition
- To test if appropriate error message is displayed when the user hasn't written their name during the account creation process
- The developer will enter the preconditions to set the application
- Now put the expected result in its designated slot.
- Here is a sample that will help you understand the steps in a better way.

Title: Login page – Authenticate successfully on gmail.com

Description: A registered user should be able to successfully login at gmail.com.

Precondition: The user must already be registered with an email address and password.

Assumption: A supported browser is being used.

Test Steps:

1. Navigate to gmail.com
2. In the email field, enter the email of the registered user
3. Click on the "Next" button
4. Enter the password of the registered user
5. Click on "Sign in"

Expected Results: A page displaying the gmail user's inbox should load, showing any new message at the top of the page.

Here's what this test case would look like in TestLodge:

Fig. 2.4.3. A sample template on interpretation of the test case and execution of the same

TC02 – Login page – Authenticate successfully on gmail.com

Last updated on: 29th Dec, 2018, Last saved by: (Agradeep Paul), View Status A registered user should be able to successfully login at:

Test Steps:

1. Navigate to gmail.com
2. In the email field, enter the email of the registered user
3. Click on the “Next” button
4. Enter the password of the registered user
5. Click on “Sign in”

A page displaying the gmail user's inbox should load, showing any new message at the top of the page.

2.4.4 Rapid and Agile Application Development

Rapid Application Development (RAD)

- The Rapid Application Development (RAD) model is an agile development method that emphasises quick response and high-quality results.
- RAD, as opposed to the Waterfall method, focuses on procedures rather than design. To generate new software prototypes, RAD employs existing code, repurposed models, and tried-and-true techniques.
- As a result, for software developers and online applications, the Rapid Application Development paradigm provides a dynamic, adaptive, and time-saving choice.
- The Rapid Application Development methodology is best suited for situations when new applications must be developed within two to three months.
- However, it is essential to know that in order to construct anything on a RAD platform, the requirements must be properly specified.

Agile Application Development

- Rapid approaches answer to the IT industry's desire for more agile deliveries for its clients, modernising the organisation.
- The goal is to make dynamic and adaptable initiatives that result in a significant shift in the culture and vision of managers and members of internal teams.
- The creation of processes is matched to a collaborative programme, focused on speed and flexibility, based on a more dynamic approach model and agile methodology.
- The agile technique makes use of intelligent software with a broad range of actionability. The professionals, as well as the tools, work in an interactive manner, with the team actively participating in the duties.
- The basic features can be supplied to consumers prior to the project's completion, and they can even be scaled in phases or partial deliveries.
- A mechanism like this helps intelligent programme resolution while also preventing mistakes and failures caused by the process.

Rapid vs. Agile

In contrast to Agile's emphasis on production time, rapid application development promotes quick prototyping rather than more expensive planning.

While both RAD and Agile emphasise early product delivery and the ability to satisfy changing needs even in late development, Agile takes a step farther in prescribing its methodologies, work environments, and goals.

As a result, one may infer that the RAD technique is far more pliable, stressing excellent products precisely and on schedule, with no big rules.

Agile is a term used in the IT sector to represent a distinct way of project management.

Its purpose is to assist teams in giving rapid and surprising replies to input, although its development takes a little longer.

When planning a work in a short period of time, RAD is the best option since you will produce from a perspective that aspires for immediate actions and outcomes.

Agile's culture varies from other types of work in that it focuses on the people who work and how they collaborate.

The goal is for solutions to emerge via cooperation among multifunctional teams utilising best practises for each environment.

Notes



UNIT 2.5: Work Requirements and Roles at Entry Level

Unit Objectives



By the end of this unit, participants will be able to:

1. Deliberate the purpose of variables, constants, and classes in yielding better coding standards.
2. Categorize basic types of work requirement related to software development, including Information (qualitative and quantitative), Algorithms (steps in problem solving), etc.
3. Demonstrate mechanisms to process requirements related to testing, maintenance, enhancement, documentation of entry level technicalities.
4. Construct logical analysis, problems solving skills, process approach and pseudo code for software development.
5. Analyse the use of linguistic notations, visual notations, and formal notations in developing software code.

2.5.1 Coding Standards

In the Coding phase, several modules indicated in the design document are coded in accordance with the module specification. Writing code in a high-level language using the design document developed during the design phase and unit testing it are the main goals of the coding phase.

Good software development companies utilise code standards to make sure that their programmers follow a clear and consistent coding style. Businesses generally develop their own coding standards and regulations based on what best suits their operations and the types of software they produce. Programmers must closely adhere to coding standards to avoid having their work rejected during code review.

The purpose of Coding Standards:

- A coding standard offers the programmes developed by various engineers a consistent look.
- It encourages code reuse and makes faults more obvious.
- It reduces complexity while making the code more readable and maintainable.
- It encourages sound programming practises and increases programmers' productivity.

Naming conventions for constants, functions, global variables, and local variables:

The following are some of the name conventions:

- Anyone can comprehend a variable's purpose if its name is meaningful and comprehensible.

- Local variables should be named using camel case letters beginning with a small letter (for example, localData), whereas global variables should have their names start with a capital letter (e.g. GlobalData). Constant names should only have capital letters (e.g. CONSDATA). Avoid using digits in variable names wherever possible.
- Function names should be written in camel case, beginning with a tiny letter.
- The purpose of utilising the function must be short and clearly stated in the function name.

2.5.2 Software Development Life Cycle (SDLC)

A framework known as the Software Development Life Cycle (SDLC) outlines the procedures that must be followed throughout each stage of software development. It includes a thorough outline of the strategy for creating, deploying, and maintaining the programme.

The full cycle of development, or all the activities involved in organising, producing, testing, and deploying a software product, is defined by the SDLC.

SDLC Process

The SDLC process outlines the numerous steps needed in creating software to produce a high-quality end product. The stages of the SDLC encompass the whole life cycle of a piece of software, from conception through retirement.

Following the SDLC process results in the software being developed in a methodical and controlled manner.

Purpose:

Delivering a high-quality product that meets the needs of the client is the goal of the SDLC.

Requirements collecting, designing, coding, testing, and maintenance are the steps that the SDLC has identified. It's critical to follow the stages if you want to deliver the Product in a methodical way.

SDLC Cycle

The process of developing software is represented by the SDLC Cycle.

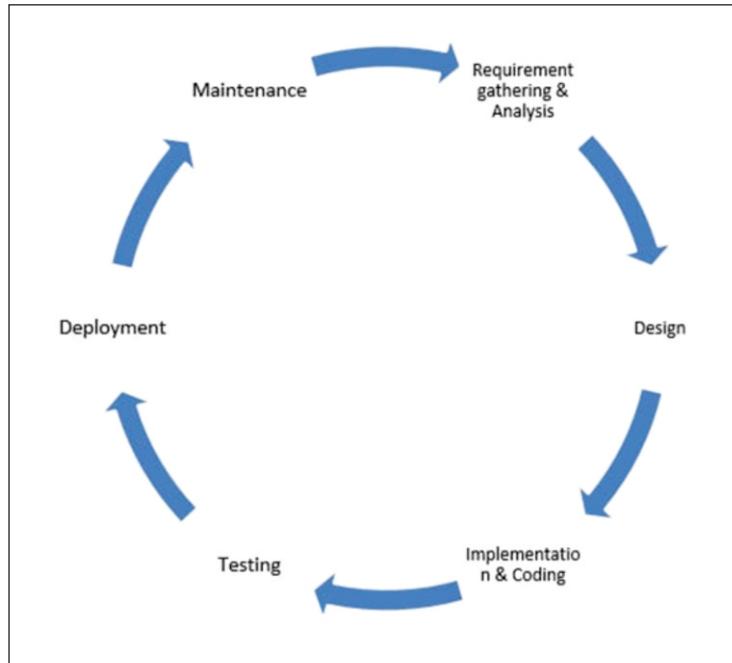


Fig. 2.5.1 SCDL Cycle

The phases are:

- Requirement gathering and analysis
- Design
- Implementation or coding
- Testing
- Deployment
- Maintenance

2.5.3 Logical Analysis

Software engineers employ logical analysis when writing the coding for an application. The evaluation and verification of the codes' correctness is a difficult task.

2.5.4 Problem Solving and Process Approach

A mobile, computer or laptop cannot solve problems on their own if a user does not program them and operate them accordingly. For every possible problem that can arise in software development, the programmer has to write down solutions. In this case, the programmer or junior software developer has to have these skills.

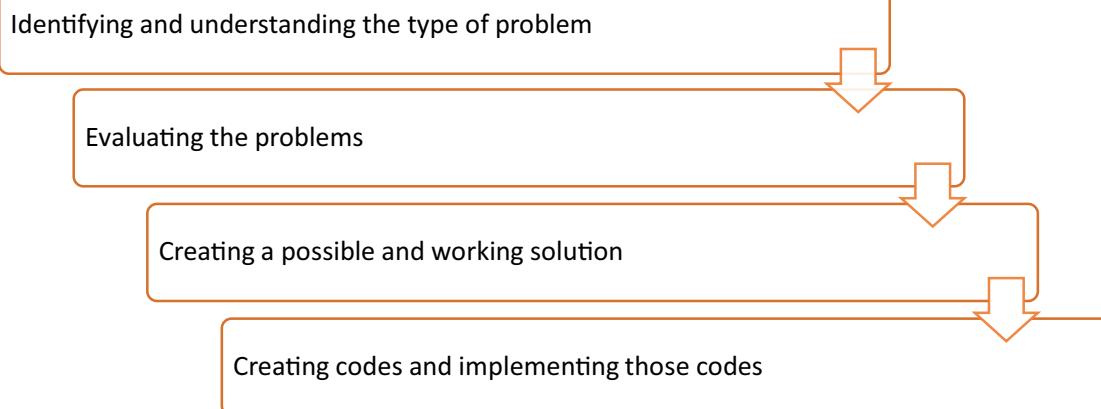


Fig. 2.5.2 Skills required by junior software developer

A computer cannot resolve an issue on its own. To solve an issue, one must provide the computer with step-by-step instructions. In actuality, a machine cannot solve problems. A human must. The programmer is responsible for formulating the answer to the issue in terms of straightforward processes that the computer can comprehend and carry out.

In order to solve a problem by the computer, one must pass through certain stages or steps. They are:

1. Comprehending the problem
2. Analyzing the problem
3. Developing the solution
4. Coding and implementing

- **Comprehending the problem:** Here, we try to understand the overall problem to be solved. Before proceeding with the next stage or step, we should be sure about the objectives of the given problem.
- **Analyzing the problem:** Following a full grasp of the issue, we consider potential solutions and assess each one. Finding a suitable answer to the issue is the goal here. A comprehensive overview of the series of actions that must be taken to solve the given problem is the outcome of this step.
- **Creating the solution:** In this phase, the overview of the actions performed in the analysis stage is expanded to provide a thorough, step-by-step solution to the issue at hand.
- **Coding and putting into practise:** The complex set of procedures must be converted into a language that a computer can understand as the last stage in solving a problem. The chosen computer language for the implantation is then converted into the relevant instruction or instructions for each stage in this procedure.

2.5.5 Analytical Skills

The ability to see a problem's complexity, organize it, solve it, predict the future, and develop new ideas are all examples of analytical talents. In addition, analytical thinking entails correctly assessing circumstances and offering insight into how various aspects interact by utilizing the information already available. Because of this, analytical abilities strongly emphasize determining the causes of problems and projecting their effects. Therefore, one's analytical abilities are valued by employers and hiring managers since they are essential for planning and strategizing the business' operations.

Types of Analytical Skills

1. Critical thinking

Using data collection and critical thinking knowledge, one may intelligently decide on a scenario. In order to provide a workable solution, it also weighs risks and priorities while doing ongoing evaluations to alter priorities. Applying critical thinking is necessary for an analytical approach.

2. Information and Research Analysis

For any analysis, research is necessary. It enables to get pertinent data from reliable sources or field research investigations. One can have more accurate analytical results or forecasts if the data is well-researched. Then, depending on the amount of data available, where one gets the information, and other circumstances, one can conclude.

3. Data Analysis

Before drawing any conclusions, a data scientist employed by an e-commerce business examines big data sets. This proof can relate to the number of consumers of a specific item, service, vacation spot, or other things the business offers.

2.5.6 Notations

A notation is a set of images or symbols, letters, and shortened sentences used, for instance, in the arts and sciences to conventionally represent technical facts and numbers. As a result, a notation is a group of associated symbols, each assigned a meaning that is arbitrary and designed to promote organised communication within a certain topic of knowledge or academic discipline.

General agreements in the writing or notation of objects are referred to as standard notations. However, it may also be found in fields like commerce, economics, and music. The phrase is typically used in technical and scientific fields of study including mathematics, physics, chemistry, and biology.

Linguistic Notations: Linguistic notation is employed in linguistics to represent features of language. There are several traditions that are frequently observed, perhaps with minor deviations. Teflpedia strives to adhere to these standards.

These consist of:

- Standard linguistic abbreviations, such as N for "noun"
- Error notation is used to precisely mark mistakes like "She ate breakfast."

Visual Notations: Visual notations are frequently employed to give PLs a graphical representation. We performed a systematic mapping with the goal of examining the visual representations of PLs associated with software. 64 PLs were found and examined. As a result, we observed a lack of agreement over the components that have to be represented in a PL and the symbols that should be used to do so. Additionally, the majority of PLs have unclear or unimpressive visual representations.

Formal Notations: There are two primary groups of formal notations that have influenced computers. A finite number of stages, phases, states, or steps are used in finite process notations to represent computation sequences and processes. This comprises a variety of diagrammatic notations, such as formal grammars and production rules, as well as textual notations, such as state-transition networks and flowcharts.

The second is infinite state, which may be expressed mathematically in more "algebraic" or "algebraic" notations, depending on how clear they are.

2.5.7 Pseudo Code

Pseudo Code is a readable and detailed description that should be done by an algorithm or a computer program. The presentation of pseudo code isn't done in a programming language but formally-styled natural language. It helps the software developers to design their programs in details.

Let's look at the given simple code to check if the given integer is even or odd.

```
#include<iostream>

using namespace std;

int main()

{
    int x;

    cout<<"Enter a number";

    cin>>x;

    if(x%2==0)

        cout<<"Even Number";

    else

        cout<<"Odd Number";

}
```

The pseudocode of the above program:

```

READ x
COMPUTE x%2
IF x%2 == 0
    PRINT "Even Number"
ELSE
    PRINT "Odd Number"
EXIT

```

Both algorithms and programmes are not what the Pseudo code is. It is a programme in an abstract form. It is made up of English-like phrases that carry out the necessary procedures. It has an algorithmic definition. It does not make use of any graphics.

The programme is expressed using words and phrases in pseudo code, however the program's syntax is not rigorously adhered to.

Advantages of pseudo code

Any programming technique benefits from pseudocode's improved readability. One of the best methods to start developing an algorithm is via pseudocode.

It acts as a connection between the algorithm or flowchart and the software. A developer's programme can be easily understood when pseudocode is printed out as informal documentation. In industries, the documentation process is crucial. A pseudo-code is useful in this situation.

The main goal of pseudo code is to simplify the code generation process for the programmer by describing what each line of a programme should do.

Main Constructs of Pseudo code

The ability to represent six programming structures (always written in uppercase) lies at the heart of pseudocode: SEQUENCE, CASE, WHILE, REPEAT-UNTIL, FOR, and IF-THEN-ELSE. Keywords are another name for these constructs. We can use them to describe the algorithm's control flow.

- **SEQUENCE:** Represents linear tasks sequentially performed in a 'one after the other' manner.
- **WHILE:** It is a loop with a condition at its beginning.
- **REPEAT-UNTIL:** It is a loop with a condition at the bottom.
- **FOR:** another loop with Initialisation, Condition, and, Incrementation at its beginning.
- **IF-THEN-ELSE:** is a conditional statement that alters the algorithm's flow.
- **CASE:** is an IF-THEN-ELSE generalization form.

There are some different Pseudocodes Constructs like CALL, EXCEPTION, WHEN, etc., for Calling a function and Handling an exception.

Rules for Writing Pseudo codes

- We make Pseudocode more generally understandable by following a few simple rules.
- We should Always capitalize the first letter of each word in Pseudocode.
- Each line should only contain one statement.
- Use Indentation to illustrate hierarchy, increase readability, and show nested structures. It also helps in the comprehension of the decision-making and execution mechanisms.
- Use any of the Finish keywords to end multiline sections (ENDIF, ENDWHILE, etc.).
- Maintain the independence of your statements in terms of programming languages.
- Keep it Finite, Short, simple, and easy to understand.

Notes



UNIT 2.6: Tools and Software for testing Entry Level Tasks

Unit Objectives



By the end of this unit, participants will be able to:

1. Discuss the various software engineering approaches to develop applications.
2. Discuss the purpose of C++, Java, Smalltalk, and Visual Basic in yielding better language standards.
3. Discuss how to store and retrieve information.
4. Build data base skills including DBMS, data design, and querying table structures for specific data.
5. Construct a documented resolution of statistical analysis.
6. Execute the policies and compliance requirements that apply to IT service requests for software coding.

2.6.1 Software Engineering Approaches

1. **Structured Approach:** It involves step-by-step structured stages. It acknowledges the fact that software development should occur in proper order.
2. **Agile Approach:** The emphasis is less on predefined structured processes and more on the team who are developing the system.

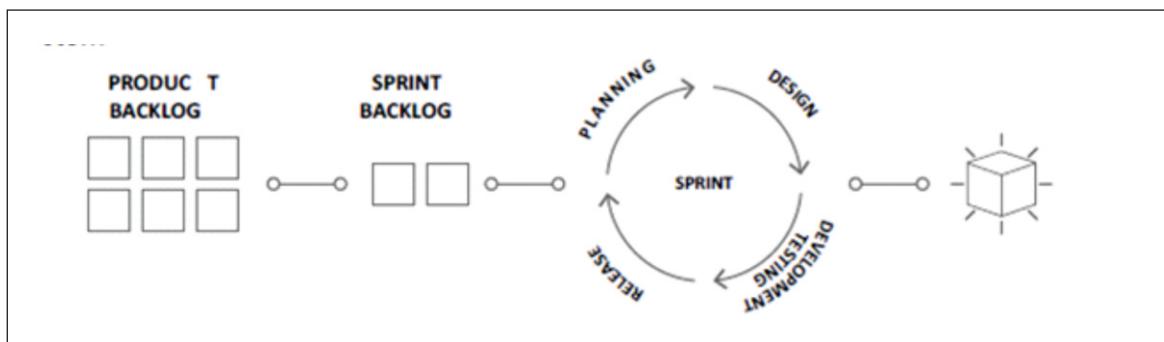


Fig. 2.6.1. Agile development cycle Prototyping Approach

3. **Prototyping Approach:** This is a circular approach that leads to the interaction between software developers and customers regarding the prototype they want as their final product.
4. **End-User Approach:** This approach is mainly focused to those application packages that users can customise using automatic code generating devices or wizards.
5. **Rapid Application Development Approach:** It allows users to build usable systems within a short period.

Key Processes Used for Development Application Software



Fig. 2.6.2. Different phases of a software development project

Planning	It ensures that the project is flawless and its progress is positive.
Analysis	This ensures that the software's performance is on point and notes are made. If any additions are to be made on the software.
Design	This step focuses on the architectural aspect on the grounds of which the projects are built.
Development and Implementation	Software development begins with this step, and at the background, data recording goes on. After the software development, it is implemented to see if the software is functioning or not.
Testing	This ensures that the software does not have any documents bugs or errors.
Maintenance	This ensures that the developed software has proper periodic maintenance and upgrades.

Table 2.6.1. Different phases of a software development project

2.6.2 Programming Language Fundamentals

Regardless of the programming language one decide to learn, the essential principles of programming remain the same. These ideas include:

- Variable Declaration
- Basic Syntax
- Flow Control Structures (Conditionals and loops)
- Data Type and Structures
- Object-Oriented Programming
- Functional Programming
- Debugging
- IDEs and Coding Environments

Variable declaration

Variables serve as memory locations for data types and as containers for storing data values. Language-specific declarations or keywords are used to construct variables.

Alphanumeric variable names typically comprise the letters a through z and the numbers 0 through 9. They may also contain special characters like the dollar symbol or underscore.

Any data type that the programming language supports can have values stored in a variable. During the course of the programme, this value could alter.

Basic syntax

One must master the basic syntax of the programming language you are studying. Every programming language has its own syntax.

The principles that define a language's structure are referred to as its syntax. Without its syntax, a programming language is nearly difficult to read or comprehend.

Let's define a variable called greet and give it the value "Hello World" as an example:

- C++
- JavaScript
- Java
- Python

```
#include <iostream>

using namespace std;

int main() {
    // your code goes here
    string greet;
    greet = "Hello World";
    cout << greet;
    return 0;
}
```

Data types and structures.

The classification of data is referred to as data kinds. The most typical data kinds are as follows:

String

The Boolean (true or false)

Numbers, which include floating-point numbers and integers (whole numbers starting at 1) (decimal-base)

Individuals (includes single alphabets or numbers)

Tables (a collection of data, usually of the same data type)

A group of data values is referred to as a data structure. Operations that may be used on that data are included in these structures. In computer programming, data structures are crucial for swiftly handling, storing, and organising data.

Typical examples of data structures are:

- Stacks
- Heaps
- Trees
- Linked lists
- Queues
- Arrays
- Tables
- Graphs

Flow control structure

The core elements of computer programmes are flow control structures. They are instructions that let a software "decide" whether to go in a certain path or not.

Sequential, selective, and iterative control structures are the three fundamental types.

Sequential

Sequential control flow is the most fundamental type of control flow. It entails the sequential execution of code statements. A practical illustration is following a recipe when cooking.

the choice (conditionals)

The fundamental idea behind selection flow control is that the computer determines what to do based on whether the outcome of a test or condition is true or false.

Iteration (Loops).

A loop is a programming construct that enables the repeated execution of a statement or block of code until a specific condition is no longer true (will return Boolean, true or false). It is among the most essential and potent programming ideas.

Functional programming

Functions are containers that accept various inputs and output results. A function does not always have to return a value. For the same set of inputs, pure functions will always provide the same output.

Pure functions are used in functional programming, a simple technique for creating software. The occurrence of data mutation or adverse consequences is prevented by this procedure.

Object-oriented programming (OOP) is a notion in computer science that is centred on "objects" and "methods."

OOP is based on four principles:

- Inheritance
- Polymorphism
- Abstraction
- Encapsulation
- Debugging

A vital ability is debugging. It entails finding and fixing any problems, flaws, or "loopholes" in one's code, both current and potential.

IDEs and Coding Environments

Integrated Development Environments, or IDEs, are software tools that programmers use to develop code and arrange text sections. It contains extra capabilities like code completion, code compilation, debugging, syntax highlighting, etc. that boost a programmer's efficiency and productivity.

Common examples of IDEs include: Visual Studio code

- IntelliJ IDEA
- NetBeans
- Eclipse

2.6.3 C++

A general-purpose programming language called C++ was developed to enhance the C language by introducing an object-oriented paradigm. It is an imperative compiled language.

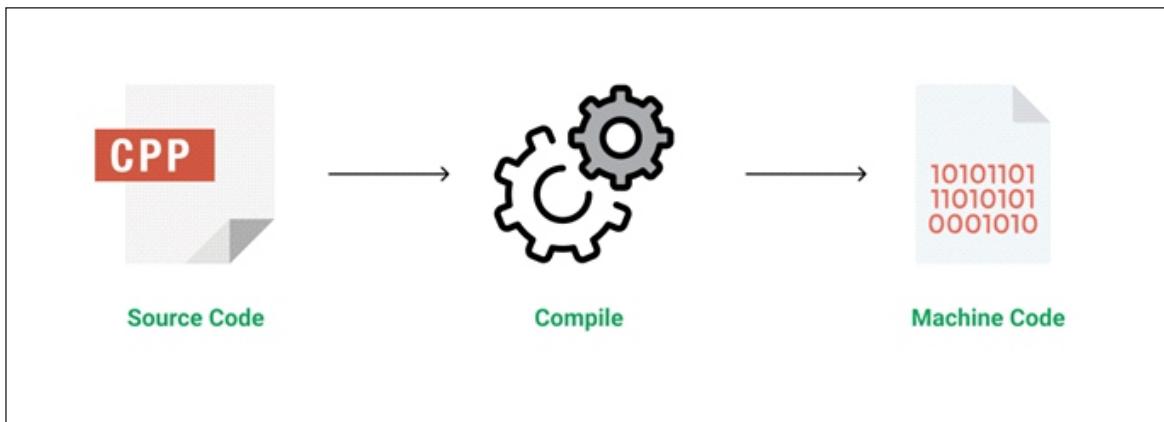


Fig. 2.6.3. C++ Language Programming

Because C++ is a middle-level language, it has the benefit of enabling the development of both low-level (drivers and kernels) and even higher-level programmes (games, GUI, desktop apps etc.). Both C and C++ have the same fundamental grammar and coding structure.

Some of the features & key-points to note about the programming language are as follows:

- It is simple in the sense that programmes may be divided into logical units and portions, it has a robust library support system, and it supports a wide range of data types.
- **Machine Independent but Platform Dependent:** C++ executables are machine independent but not platform independent (apps generated for Linux won't execute on Windows).
- **Mid-level language:** This language is mid-level because it may be used to create both large-scale user applications and systems programming (drivers, kernels, networking, etc). (Media Players, Photoshop, Game Engines etc.)
- **Rich library support:** For quick and efficient development, has a rich library support that includes both third-party libraries (like the Boost libraries) and standard built-in data structures, algorithms, etc.
- **Speed of execution:** C++ applications run extremely quickly. Given that it is a highly procedural compiled language. The total speed of the program's execution is slowed by newer languages' additional built-in default features like garbage collection and dynamic typing.
- Since C++ doesn't have any additional processing cost like this, it is extremely speedy. Direct Memory-Access and pointers: C++ has pointer functionality that enables users to directly alter storage addresses. Low-level programming is made easier by using this (where one might need to have explicit control on the storage of variables).
- **Object-Orientedness:** One of the features that makes this language superior than C. The support for object-oriented programming in C++ makes applications flexible and manageable. Large-scale applications can be created, etc. As code size increases, procedural code becomes more challenging to maintain.
- **Compilation:** The fact that C++ is a compiled language adds to its performance.

Expression and Interactivity

The expressions and interactivity in C++ can be defined with the help of multiple terms such as-

CIN Objective:

- The CIN is an object used to read data typed at the keyboard.
- It is useful when user has access to the program through command line and can specify his own variable values.

Example

Int baskets;

- //will print to line the question string
- Cout << " How many baskets do you have?";
- //program pauses and waits for the input value of baskets
- Cin >> baskets;
- Cout << " you entered:" << baskets
- << "you'll need" << baskets << " water bowls!";
- // Notice that the semicolon need not be on every line but at the end of the statement

Mathematical Expression

- C++ allows one to construct complex mathematical expressions using multiple operators and grouping symbols
- Sum= 6+6;

The value 6+6 is assigned to the sum in this expression statement

Implicit Type Conversion

- The process of conversion of a value from one data type to another is called type conversion.
- In implicit type conversion, the compiler automatically transforms one fundamental data type into another.

Example

Suppose, there is a daily fluctuation in the price of petrol for a week such as Day 1= 88.15, Day 2= 88.16, Day 3= 88.15, Day 4=88.16, Day 5= 88.15, Day 6= 88.14. Day 7= 88.15 Therefore, the price value can be assigned to any day in the week as there is negligible difference between the decimal and fractional parts
Int price= Day 4.

Explicit Type Conversion

- Here the typecasting is done in a definitive way and not automatically
- The developer uses a casting operator to direct the conversion

For example, double b=164.00125;

- int x;
- x=(int) b;

Thus, here the type conversion is done explicitly and the converted value is assigned to X;

Overflow and Underflow

Overflow in a condition where the result of the operations performed with two numbers exceeds the maximum value the data type can have

Example

If a is 100 (01100100) and b is 30 (00110010), a+b is 130 (10010110), which is more than the maximum value of 127. Therefore, a+b will be read as -126 (-106=130-256). Therefore, it is an example of signed overflow, where result is modulated by range.

Underflow refers to a condition in computer program where the result of a calculation is an absolute value smaller than could be represented by the computer in memory.

Example:

If the exponent part represents values from -127 to 126, a value less than -127 can cause underflow.

2.6.4 DBMS

DBMS or Database Management System is a cloud tool (software) for arranging data in a database. It stores and transforms information from data to make decisions. It has 3 elements:

- Database scheme
- Database engine
- Physical database

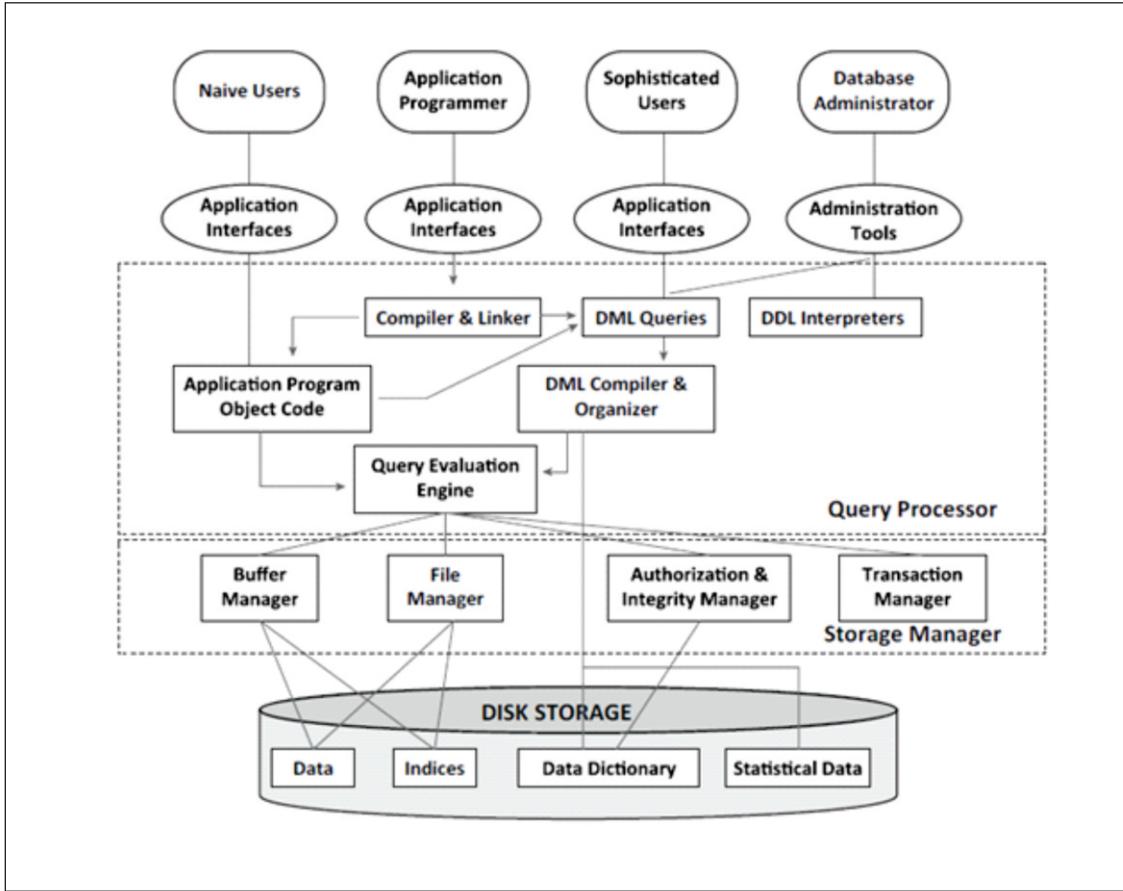


Fig. 2.6.4. A representation in the flowchart of the Database Management System

Data Design

This is the initial activity to create an efficient program structure that is modular but not too complex to follow. For an effective and efficient data design, there are certain principles that developers need to follow:

- Abstract data types should act as supporting material for a programming language
- Useful data structures should be maintained alongside operations

Querying Table Structures for Specific Data

Partitioned Tables

- Separates file groups (both similar and different)
- Conducts Data division horizontally to improve data retrieval performance

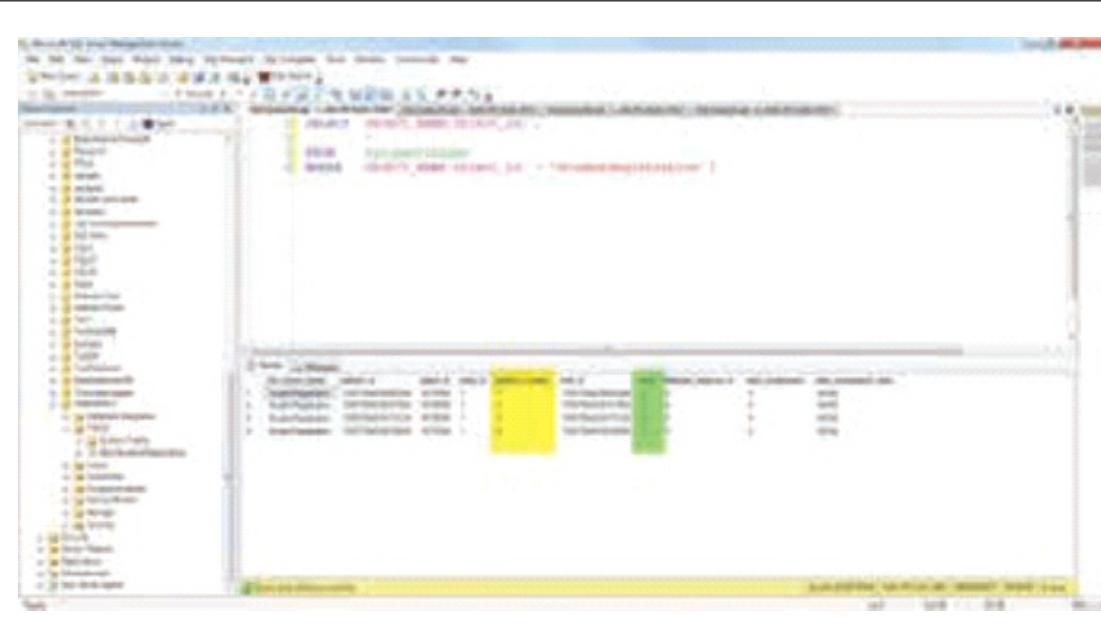


Fig. 2.6.5. Partitioned table

System Tables

- Stores SQL Server information within SQL Server Engine

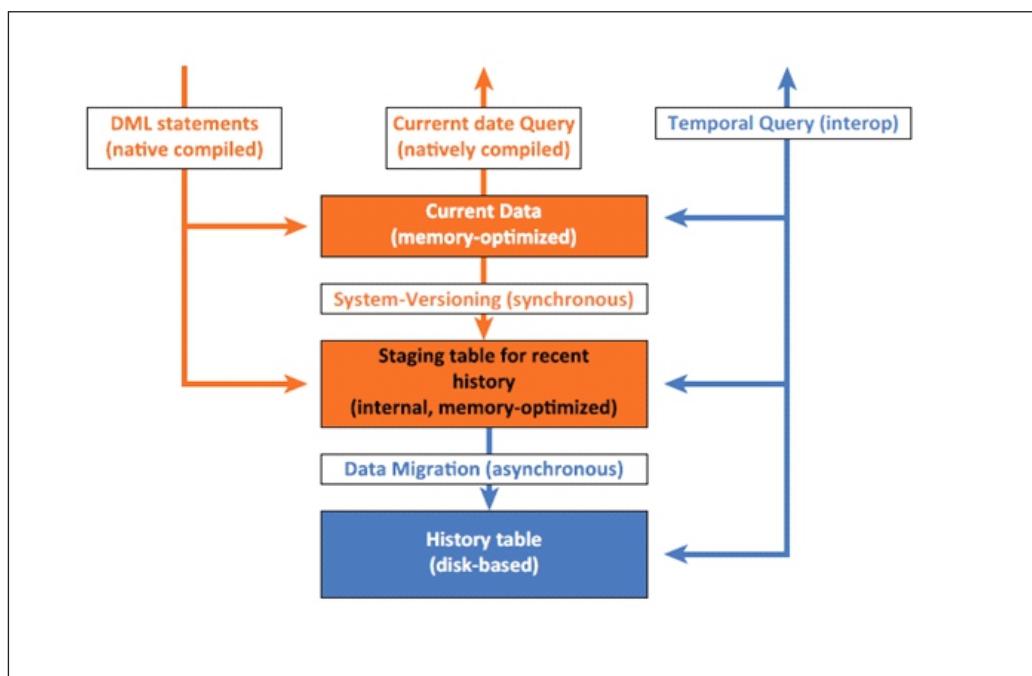


Fig. 2.6.6. System Table

Wide Table

- Useful for optimised storage for NULL values
- Uses Sparse Column

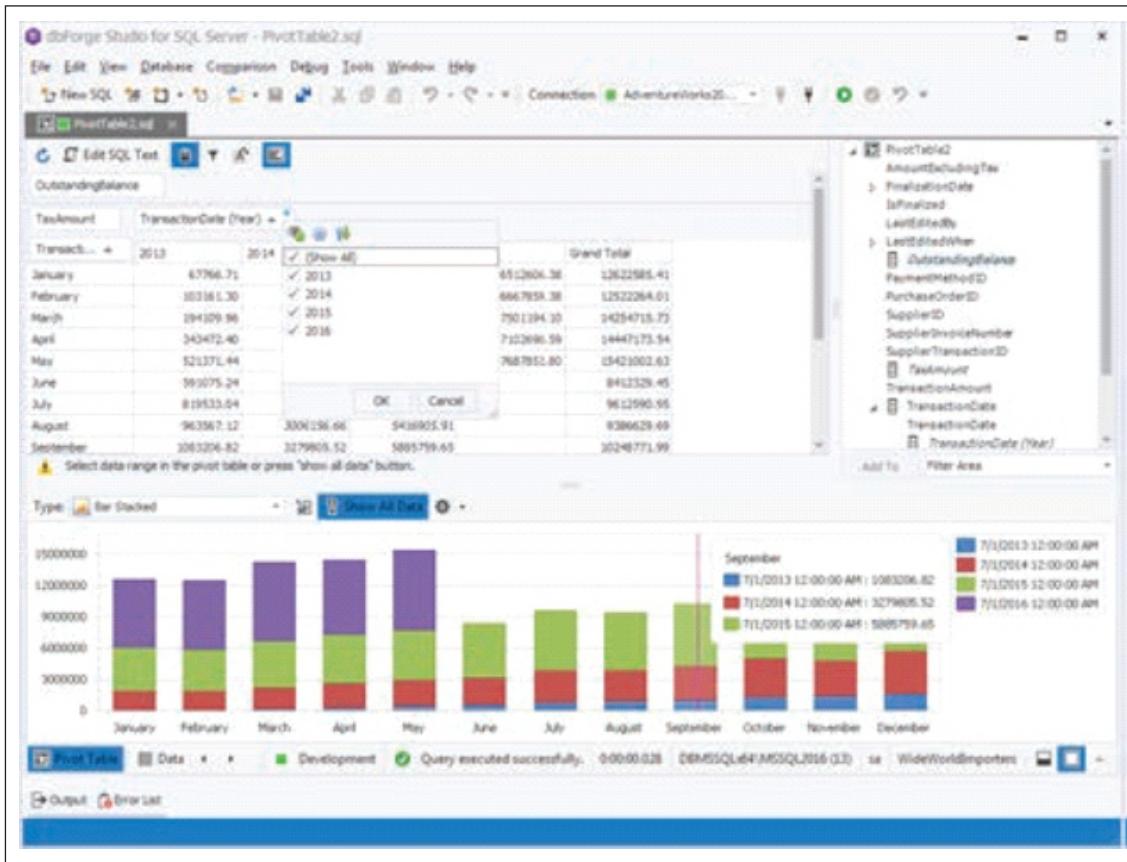


Fig. 2.6.7. Wide table

Data Processing vs. Data Management Systems

Although both Data Processing and Data Management Systems relate to operations that take raw data and convert it into useable information, the phrases are used in quite different ways. Data processing is the broad phrase for what massive mainframe computers did from the late 1940s to the early 1980s. It is still done to varying degrees in the majority of large firms today. Large amounts of raw transaction data are sent into systems that update a master file with paper-based fixed-format reports.

The name Data Management Systems refers to an extension of this idea, in which raw data, traditionally transferred manually from paper to punched cards and then onto data-entry terminals, is now delivered into the system from a number of sources, including ATMs, EFT, and direct consumer entry over the Internet. Database management systems have essentially overtaken the master file idea, and static reporting has been replaced or supplemented by ad hoc reporting and direct enquiry, including data download by clients. The Internet's and personal computers' pervasiveness has been a driving force in the evolution of data processing to the broader global idea of data management systems.

Advantages of DBMS

Usage of DBMS for managing data has many advantages:

- **Data independence:** Application programmes should be as free of data representation and storage details as feasible. To protect application code from such intricacies, the DBMS might give an abstract representation of the data.
- **Efficient data access:** DBMS stores and retrieves data using a range of sophisticated approaches. This capability is especially useful if the data is kept on external storage devices.
- **Data integrity and security:** If data is constantly accessible via the DBMS, the DBMS can enforce data integrity requirements. Before adding wage information for an employee, for example, the DBMS can ensure that the department budget is not exceeded. Furthermore, the DBMS can impose access rules that regulate which data is visible to various types of users.
- **Data Administration:** When several users share the same data, centralising data administration can provide considerable benefits. Experienced specialists who understand the nature of the data being managed and how different groups of users interact with it can be in charge of structuring the data representation to avoid redundancy and fine-tuning the data storage to make retrieval efficient.
- **Cross recovery and concurrent access:** A DBMS arranges concurrent data accesses in such a way that users may imagine the data being accessed by just one user at a time. Furthermore, the DBMS shields users from the consequences of system failures.

Disadvantages of DBMS

- **Overkill Risk:** A database system is frequently not recommended for tiny and basic applications for single users.
- **Size:** Due to the DBMS's complexity and range of capability, it is an extraordinarily big piece of software, taking up several gigabytes of disc space and demanding significant amounts of RAM to execute properly.
- **Complexity:** A database system adds new layers of complexity and needs. The supply and administratoion of a database management system with multiple users and databases is both expensive and time-consuming.
- **Qualified Personnel:** The professional administratoion of a database system necessitates the use of adequately trained personnel. Nothing will operate for long without a trained database administrator. A database system is a multi-user software which is often less efficient than specialised software which is produced and optimised exactly for one problem.

- **Performance:** A File Based system is often built for a single purpose, such as invoicing. As a consequence, overall performance is quite good. The DBMS, on the other hand, is built to be more broad, to support several applications rather than just one. As a result, certain apps may not run as quickly as they used to.
- **Increased failure impact:** The concentration of resources makes the system more vulnerable. As all users and applications depends on the DBMS's availability, the failure of any component can put operations to a standstill.
- **Lower Efficiency:** Because a database system is multi-purpose software, it is frequently less efficient than specialised software that is designed and optimised specifically for one problem.
- **Costs:** When a database system is employed, additional expenses are paid for the system itself as well as for additional hardware and the system's more complex operation.

Exercise

1. Explain importance of social media literacy.
2. Explain the problem solving and process approach.
3. Explain steps involved in algorithm development.
4. What is Software Requirement Specification?
5. Name types of Analytical Skills.
6. State advantages and disadvantages of DBMS.

Notes



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3. Manage Your Work to Meet Requirements

Unit 3.1 - Importance of Following Work Instruction and Complying with Company Policies

Unit 3.2 - Work Ethics to Follow in an Organization



Key Learning Outcomes



By the end of this module, participants will be able to:

1. Discuss the importance of following work instructions and complying with company policies.
2. Recognize proper work ethics to follow in an organization.

UNIT 3.1: Importance of Following Work Instruction and Complying with Company Policies

Unit Objectives



By the end of this unit, participants will be able to:

1. Discuss and agree to work requirements with appropriate people.
2. Demonstrate how to obtain guidance from appropriate people, where necessary.
3. Identify the methods so that the work meets the agreed requirements.
4. Recognize how to use resources correctly and efficiently.

3.1.1 The Importance of Completing Work Accurately and How to Do This

Relevant data is important in every professional field. Finishing tasks accurately and on time is essential in the workplace. When employees finish their work correctly, and within the stipulated time, they directly influence the company's growth, profit and efficiency.

Establish and agree on work requirements with appropriate people

For a Junior Software Developer, it is crucial to meet the deadline. The various requirements to be met are:

- Activities (what is required to be done).
- Deliverables (output of work).
- Quantity (the amount of work to be done).
- Standards (acceptable performance coupled with compliance and service level agreement).
- Timing (the stipulated time for completion of task/s).

A Junior Software Developer must obtain valuable information from:

- **Subject Matter Expert (SME):** SME is the point of contact in case a Junior Software Developer faces an issue during operations
- **Floor Manager:** Manages a team and looks after the operations as well as HR-related issues of the employees under him/her. Associates get placed under a Floor Manager who, in most cases, becomes their reporting person.
- **Process Manager:** A Process Manager has more than one team under him/her supervision. The profile is more like an Operations Manager who has the entire ops team to look after. In an organization, there might be five teams under separate Floor Managers. However, these five teams will be looked after by the Process Manager.

- **Floor Supports:** Floor Supports are coordinators who mainly look after the smooth coordination between various teams. For example, a Floor Support must coordinate with on-floor teams to get a job done without hassle. Whereas SMEs are only the experts in the operations, Floor Support must be well-versed with various processes, including the core operations.
- **Team Lead (TL):** Team Lead is appointed under each Floor Manager to look after the operations. While the Floor Manager must take care of every issue of the employees under him/her, Team Lead looks after the operations. Team Leads are often empowered with authority to perform HR-related tasks, such as leave approval, grievance handling, etc. However, in most organizations, TLs are placed under the Floor Manager to help him/her look after the team.
- **Manager:** A manager is one rank higher than the Process Manager. Under one Manager, multiple teams, such as Ops Team, Caller Team, Chat Team, and Email Team, are allotted. The manager looks after all the aspects of an organization, including operations, HR and Sales.
- **Immediate Seniors:** Immediate Seniors are the seniors in the same team. A team is made of Junior Associates and Senior Associates to maintain a balance. Senior Associates can be SMEs as well (depending on the decision of an organization). It is advisable for Junior Associates to consult an SME or a Senior Associate first to mitigate an issue.

It is important for a Junior Software Developer to stick to the Service Level Agreements (SLAs)

- Service level agreement is a crucial element of the service contract.
- SLA is the time considered to finish a job as per the contract. For instance, internet service providers are likely to consider service level agreements where the time range of the net service will be considered.
- SLA consists of two basic components: Mean Time To Recovery (MTTR) and Mean Time Between Failures (MTBF).
- Simply, SLA is the negotiated agreement between parties where one group is the customers, and the other is the service provider.



Fig 3.1.1 Team Meetings or Open Discussions Improve the Quality of Performance

Obtain guidance from appropriate people, where necessary

The principal goal of the Junior Software Developer is to learn from experienced seniors and other employees. A Junior Software Developer is aware of his/her job role. Taking help from seniors and experienced professionals will only help increase the confidence of the Junior Software Developer.

A Junior Software Developer must keep these things in mind:

Dos and Don'ts while obtaining guidance from appropriate people:

- When you approach a person, ensure that the company protocol is followed. For example, if an associate requires some assistance from someone of higher authority, he/she must know the right person in the hierarchy to approach. Initially, a Junior Software Developer should ask for guidance from the immediate boss or the Team Lead. If the problem is not resolved, he/ she should seek help from the manager or someone immediate in the hierarchy.
- Asking for assistance directly from someone at the top of the hierarchy without addressing the same to the immediate boss is considered unprofessional too.
- Always carry pens and a notebook to document the main points and try to avoid forgetting things. Approaching a person for the same issue is both annoying and redundant. The importance of keeping Minutes of Meeting must be considered. Minutes of Meeting comprises the gist of the discussion. It helps keep a written documentary of the discussion and may be used as a future point of reference.
- It is advisable to fix an appointment with the concerned person beforehand, if possible.
- Behave professionally while you are taking someone's assistance. Do not interrupt with your personal opinion. If you want further clarification, ask questions after he/she finishes speaking. Raise hands, and then ask the question for clarification.
- Always thank a person after receiving assistance from them.

Receiving guidance is the first step toward continuous learning. However, the emphasis is on the application of the learning outcomes at work. A Junior Software Developer must try to apply the guidance to increase the quality of work. This helps one grow as a learner and boosts the confidence level.

Ensure work meets the agreed requirements

One must learn the importance of pre-planning and preparing an assignment so that it can be completed in a very organized manner. The importance and benefits are:

- Planning helps in making speedy and right decisions by providing a person with adequate guidelines.
- Planning helps in preparing a person for unexpected situations and complex outcomes, thus helping the person in control of the situation in a better way.
- Preparing and planning help in optimally dividing resources like finances, raw materials, time and manpower.
- Preparing and planning help in defining, identifying, and quantifying goals so that appropriate methods can be adopted to finish the assignment on time and in an organized manner.

Work Requirement	How to Ensure that the Requirement is Met
Activities	<ul style="list-style-type: none"> • Ensure that you have a clear idea about the work requirements • Seek guidance from colleagues/seniors concerned persons in case of doubts • Follow company policies and processes while planning activities
Deliverables	<ul style="list-style-type: none"> • Deliverables are considered the output of the work • Plan in accordance with the timeline given to you to complete the work so that the deliverables are not hampered • Always measure the required output and devise a process to achieve the same
Quantity	<ul style="list-style-type: none"> • Quantity is the amount of work that needs to be done to attain the deliverables • Don't let the quality be affected due to quantity and vice versa • The balance between quality and quantity must be maintained
Standards	<ul style="list-style-type: none"> • Understand the client requirements as per SLA • Ensure that you know the acceptable standards of performance and perform accordingly • Keep the compliance-parameters in mind and do not violate the rules while working on a project
Timing	<ul style="list-style-type: none"> • Be aware of the deadline before starting a work so that you can plan your work accordingly • Set small and achievable targets. For example, decide how much work should be done on the first day and achieve it on that very day • Do not compromise on the quality to meet the deadline. For this, you need to plan things before and execute the same.

Methods Adopted to Gather Requirements and Analyze

1. While working as Junior Software Developer or an entry level employee:

- Organize, plan and prioritize the work order and jobs received
- Conduct and organize technical assignments in optimal manner
- Plan to utilize time and equipment efficiently
- Concentrate on tasks and finish them within time limits
- Assist in record keeping and proper documentation
- Work on the completed project based on the feedback received
- Ask for help from domain experts and seniors if issues arise during work
- Organize and plan own work in a way that all the tasks are completed on time and as per specifications
- Organize work as per job specifications
- Organize and plan maintenance and cleaning activities

Requirements of Decision Making

Decisions at workplace must be taken swiftly, based on the best researches, prior experience and data gathered from relevant field experiences. Such data provide ‘Evidence’ and help a person in making suitable decisions.

The requirements of efficient decision making process are given below:

- One must have adequate yet controlled access to accurate and consistent data.
- One must stick to appropriate processes in analyzing data. For example, data analysis based on the set parameters of the organization. Ensure the reliability of the source of the data.
- One must take decisions swiftly, based on the analysis of collected data.
- Apart from analyzing the researched data, one must rely on practical experiences while taking decisions.

The role and responsibilities of Junior Software Developer include the following:

- Ability to troubleshoot everyday issues.
- Analyze critical points in daily tasks through observation and experience and identify control measures to solve the issue. For example, if you are working on a particular domain on a regular basis, know the weaknesses and strengths of the point. Thorough knowledge helps to solve issues quickly.
- Find smart ways to finish a job.
- Decide whether to accept or reject particular process flow (technical aspects) based on quality parameters. For example, if process A is fit to achieve a specific goal, it does not mean that process A should be followed in every case. Consider varied processes to accomplish different goals.
- Take decisions of one’s own roles and responsibilities.

Steps involved in the Decision Making Process

The steps involved in the general decision making process are mentioned in the diagram below:

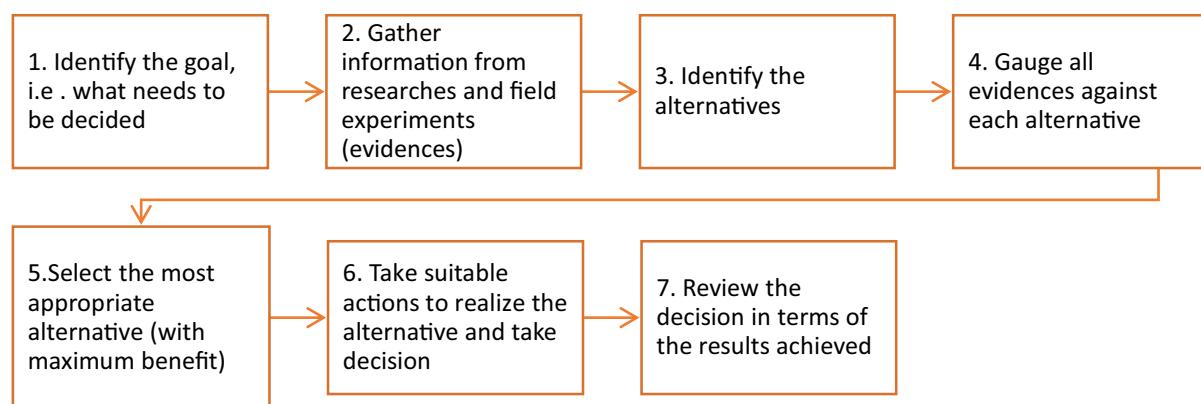


Fig. 3.1.2. Steps Involved in Decision Making

Notes



UNIT 3.2: Work Ethics to Follow in an Organization

Unit Objectives



By the end of this unit, participants will be able to:

1. Demonstrate how to keep your immediate work area clean and tidy.
2. Explain the process of utilizing time effectively.
3. Discuss the importance of treating confidential information correctly.
4. Practice working in line with organization's policies and procedures.
5. Recognize how to work within the limits of job role.

3.2.1 Appropriate Time scales for Completing Your Work and the Implications of Not Meeting These for You and the Organization

Utilize Time Effectively

There is a common saying, "Time is Money". Not only are there multiple reasons why time management is significant, but there are also numerous benefits of the same. Implementing good time management skills allows one to complete more work in a shorter period of time, which leads to more free time, reduced exposure to stress, and improved work quality. Each benefit of time management enhances another aspect of your life and this goes on in a constant cycle.



Fig 3.2.1 Time is Money

Here, we will discuss several tips for effective time management that may enhance your work and you as an individual.

- **Time is Limited:** Everyone gets the same amount of time each day, and it's limited, therefore it's imperative to make the most of your time if you ever want to be efficient at the workplace.
- **Be Decisive:** There are many options in life to choose from. When you practice good time management, you have more time to breathe; this allows you to control which choices are the best to make. You're more likely to jump to conclusions and not fully consider the different options when you feel pressed for time and have to make a decision; this leads to poor decision making.
- **Accomplish More in Lesser Time:** You're able to stay focused on the task at hand by taking control of your time. This leads to higher efficiency because you never lose momentum. Imagine running a mile where you stop every 5 seconds; this would cause you to become tired very quickly and take much longer to complete the run.
- **Learn More in Shorter Period of Time:** When you control your time and work more efficiently, you're able to learn more and enhance your experience faster. There is a reason some students graduate before the others, so imagine applying time management throughout your entire career. You will not only stand out from the rest, but you will gain experience much quicker and be able to move up in life a lot sooner.
- **Enjoy More Success:** Time management is the key to success; it lets you to take control of your life rather than follow the flow of others. You achieve more, you make better decisions, and you work more efficiently; this leads to a more successful life.
- **Reduce Stress:** One of the main causes of stress is that people get rushed. The phrase "I have so much to do and so little time to do it" is spoken with frustration which leads to stress. With good time management, you know how much time you have, how long it will take to get your tasks done, you achieve more, and have more free time. This gives you more time to collect yourself, which reduces the feeling of being rushed and which in turn leads to less frustration and stress.
- **Higher Quality of Work:** We all need some free time to unwind and relax but, unfortunately, many of us don't get much free time since we're too busy to keep up with our daily activities and work load. By applying time management skills, you can get more done in a shorter period of time leading to more free time.
- **More Discipline in Life:** When you practice good time management in your life, you are less likely to leave work for later. Time management leads to higher efficiency and leads to a disciplined life.

The three most important tools for good time management are given below:

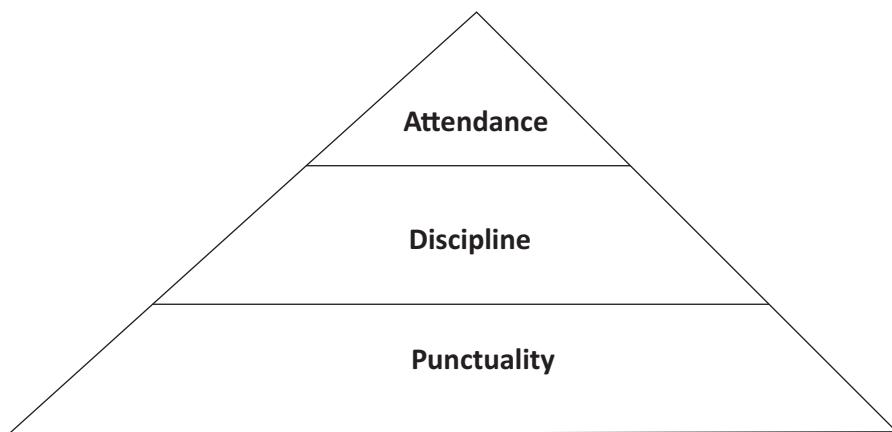


Fig 3.2.2 The Pyramid of Effective Time Management

Tips to manage time effectively:

- Adhering to one's plan
- Keeping a daily To-Do list
- Dividing one's time wisely
- Sticking to and respecting deadlines
- Not wasting time

3.2.2 Basic Work Ethics to be Followed in an Organization

Keep immediate work area clean and tidy

Keeping one's work area tidy and clean carries the following benefits:

- Avoiding accidents at the work area and the corresponding injuries and damages
- Lessening an employee's exposure to Occupational Hazards
- Permitting easy flow of materials
- Enhancing productivity at work
- Enhancing the employee's control on the various tools and equipment

The work area can be kept tidy and clean in the following manner:

A. Keep work area in a tidy and organized state

- **Clear Clutter and Spills:** Clearing clutter and spills helps prevent Slips, Trips and Falls.
- **Control Dust and Debris:** Get rid of the debris every day to avoid untidy workstation.
- **Store Tools and Equipment Appropriately in their Designated Storage Locations:** CD/DVDs should be kept in the correct place. Similarly, for any other device like pen drive, which is used daily to test/ store works, the same step should be taken.
- **Abide By a Written Set of Guidelines:** Keeping one's workstation/desk clean, tidy and organized, one must follow the SOPs (Standard Operating Procedures).
- **Store and Maintain Personal Protective Equipment (PPE) Appropriately:** Anti-glare spectacles, earmuffs are important for Junior Software Developer. Anti-glare goggles help reduce the stress of looking at the screen for a long time. Ear muffs negate the noise.

B. Keep work area safe

- Promoting the practice of looking out for signs like "Wet Floor" or "Cleaning under Progress"
- Promoting the practice of reading Directions of Use and MSDS sheet before using any chemical.
- Reporting each incident of spill (oil, grease, chemical, etc.) to the housekeeping staff with immediate effect.
- Avoiding Fire and Electrical Hazards.
- Avoiding storage of heavy objects at high and elevated areas.

Treat confidential information correctly

As a Junior Software Developer, one works in projects with confidential information. Even in the SLAs, upholding confidentiality is a major clause and the violation of the same leads to termination.

Every client wants to see that certain information is kept confidential. Information leaks can cause a huge loss and thus, Junior Software Developer must be cautious while working. To prevent information leaks which may be implied as security breach, one must install anti-spam, anti-spyware and anti-phishing tools.

To understand how to treat confidential information,

- Maintain that all the new employees accept and sign the Confidentiality Agreement
- Recognizing the relevant organizational confidential information and details must be taken into consideration. These may be in the form of:
 - Verbally disclosed information
 - Written information
 - Slides and Handouts
 - Visual information
 - E-mail and file documents
 - Carefully reviewing the NDAs from 3rd Parties

Work in line with organization's policies and procedures and Work within the limits of job role

Abiding by compliance is a must. Additionally, the company or brand image also gets affected due to work accuracy. A meticulous work helps in the development of company image as well as the ethical views in front of the professional community.

The new joinees will never understand the importance of submitting precise work if they are unaware what the expected benchmarks are. So, it is important that trainers of the particular company lay down the objectives to the Junior Software Developer. One of the best ways to do so is to take the help of "SMART."

- S-Specific
- M-Measurable
- A-Achievable
- R-Relevant
- T-Timely
 - o Slides and Handouts
 - o Visual information
 - o E-mail and file documents
 - o Carefully reviewing the NDAs from 3rd Parties

1. S - Specific: It stresses on specifying a specific goal rather than a general one. A specific goal will usually answer the "Why", "What", "Who", "Which" and "Where" questions. While carrying on with the daily responsibilities, the Attendant must take care and abide by these 5 questions, to remain clear about his/her goals and if, they are aligned towards the interests of the organization. The operator should not only work to achieve success for oneself, but also for the betterment of the organization as a whole.

2. M - Measurable: It stresses on measuring the progress towards the attainment of goal. A measurable goal usually answers the "How many?" and "How much?" questions. Whatever activities the operator should perform daily, his/her achievements must be expressed in volume, workload or quantity. This should be reported to the immediate supervisor or the Line Manager, who would be appraising the Attendant at the end of the year. A Daily Work Report (DWR) should be maintained and emailed to the supervisor daily.

3. A - Accurate & Attainable: Achieving all predefined metrics and abiding by the Service Level Agreements (SLAs). Every task should be error-free.

4. R - Relevant and Reporting Real-time: All activities and achievements, relevant to the job role, should be reported to the Line Manager, as and when accomplished.

- 5. T - Timely & Target-oriented:** Activities should be prioritized according to long term and short term goals. Short term goals should be divided into small, achievable, measurable and time-bound steps. This, in turn, would induce a sense of urgency, promptness and ownership towards one's duties.



Fig 3.2.3 Implementation of SMART Module Enhances Quality of Performance

Brainstorming

There are several ways that can improve the quality and effectiveness of brainstorming. They are:

- **Be attentive to everyone's ideas:** People pay more attention to their own ideas; however brainstorming calls for equal exposure to the thoughts produced by others.
- **Avoid face-to-face groups:** Using face-to-face groups affects assessment apprehension, social loafing, production blocking, and social matching.
- **Include both individual and group approaches:** The process that helps members mix their ideas into the group is brain writing. Here, the members write their ideas on a piece of paper and then pass it along to others who add their own ideas.
- **Take breaks:** Permit silence sessions during group discussions so that members have time to think things through.

There is no fixed timescale for work completion for any profession. The duration to complete a project depends entirely on the set rules of a company.

To ensure your work meets the agreed requirements, consider these points:

- Type of the project
- Time period allocated for research
- The time to acquire relevant data and gather resources
- Outlining the direction and the flow of work
- Analyzing data for creating test cases/prototypes

Implications of Brainstorming Sessions

Timescale and deadlines are entirely based on the complications in a project. Where efficiency of an employee, technical aspects, and accuracy in work are constantly checked, submitting the work to the clients at the designated or promised deadline is also a must. The end date or the deadline of a project is planned as per rough calculations.

In case the work or the project is not delivered on time, there are high chances of the company to bear the brunt on the stricter side. Some of the implications of a missed deadline can be:

- Weaker commitment from burnt out employees
- High-stress level
- Low morale
- Huge penalties imposed by the client
- Loss of revenue for the company
- Loss of opportunities and potent chances for business growth
- Negative effect on the brand reputation of the company

The most common factor that leads to task inaccuracy at the workplace is a misunderstanding. During OJT (On-the-Job-Training) in most companies, workers are left at the mercy of employees, who belong to other departments or different projects. Now, as these employees are in charge of assisting the new trainees at work, they provide all necessary information to prepare them well for future endeavours.

It is important that the trainers should belong to the department where the employees are placed and provide precise details. The same goes for the employees who need opening up to their trainers and leaving behind the inhibitions to finish their work with precision.

Summary

- Relevant data is important in every professional field.
- Implementing good time management skills allows one to complete more work in a shorter time, which leads to more free time, reduced exposure to stress, and improved work quality.
- When you control your time and work more efficiently, you're able to learn more and enhance your experience faster.
- One of the main causes of stress is that people get rushed.

Activity



Activity 1: Interactive Session

- The Trainer asks the Trainees the following question: "How to achieve SMART goals in an organization."
- The Trainees are expected to raise their hands to volunteer and speak.
- The language spoken during the session should be known by the majority of Trainees in the class.
- While the session goes on, the Trainer should jot down the crucial points on the Whiteboard with the help of a marker.
- The best answer shall be appreciated by the Trainer in front of the whole class.

Activity 2: Prepare a List

- The Trainer divides the class into few teams, depending on the batch strength.
- Each team will have an even number of Trainees.
- The Trainer will instruct the Trainees that each of the teams must prepare a list of Resources that are required for the job role of a Junior Software Developer.
- After the team of Trainees create the list, they will submit it to the Trainer.
- The Trainer will evaluate the 5 lists and select the best one.
- The Trainer will read out the appreciated list in front of the class.
- The most extensive and detailed list shall be appreciated with accolades.

Exercise

A. State whether the following statements are CORRECT or INCORRECT:

1. A project or a task which is both important and urgent is basically deadline driven.
2. The end date or the deadline of a project is designed on the basis of certain rough calculations.
3. Proper engagement and open communication amongst employees make the working process in a company more effective.
4. Sharing of information or updating the section which you are working with your team members will help them get a better idea of your progress.

B. Answer the Following Questions:

1. How should one obtain guidance from seniors or supervisors?
2. What are the benefits of time management?
3. Write a short note on the “Triple Constraint Triangle”.

Notes



Scan the QR Code to watch the related videos



<https://www.youtube.com/watch?v=bkRvBNQzOmo>

Work Ethics to follow in an organization





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4. Work Effectively with Colleagues

Unit 4.1 - Team Work and Communication

Unit 4.2 - Significance of Healthy Team Bonding in Ideal Work Culture



SSC/N9002

Key Learning Outcomes



By the end of this module, participants will be able to:

1. Analyze different types of breaches in health, safety, and security.
2. Explain the evacuation procedure.
3. Identify how to summon medical and emergency services.
4. Identify the method of health, safety and accident reporting.
5. Identify the Government agencies in the area of safety, health and security and their norms and services.

UNIT 4.1: Team Work and Communication

Unit Objectives



By the end of this unit, participants will be able to:

1. Explain the principles of clear communication.
2. Outline the importance of being a good listener and adhering to the commitments.

4.1.1 Different Types of Information Required by Colleagues

In all companies, departments like operations, management, and recruitment play a great role. This may be in relation with finance, operations, marketing or any other department. As there are different teams present in an office, so are the types of information.

Communicate With Colleagues Clearly, Concisely and Accurately

Effective communication allows us to comprehend the problems that our colleagues are facing, and asking them to portray it clearly. To impart clear and precise information, we need to:

- Spread positive attitude
- Ensure proper understanding regarding strategy and goal accomplishment
- Ensure that everybody complies with the company's regulatory bodies

Respect Colleagues through the Actions

- Assisting, working and asking for help from colleagues to show trust and respect.
- Increasing the morale for an effective teamwork.
- Increasing open communication between co-workers.
- Working with your colleagues to increase productivity.

Seek guidance from appropriate people to agree the analysis to be performed on the data

- One's supervisor is supposed to be one's mentor at work.
- Ask questions to clarify doubts.
- Assistance and direction must be sought from the supervisor whenever necessary.

When necessary, inquire about and request clarification on work-related duties.

A Technical Support Executive, who has joined a new project, might face issues regarding technical aspects and process. It is always preferable to ask inquiries to clarify doubts than to brood over them in silence.

There are designated departments for each aspect of an organization. For example, HR, transports, security, operations are departments that handle different issues. In case of any doubt regarding HR policy, one must seek assistance from HR personnel. If an executive gets stuck with a technical query, he/she must approach someone in operations.

- Question/s must be asked to clarify doubt and to narrow down communication gaps with one's supervisor.
- Obtain and seek clarifications on policies and procedures, from the supervisor or other authorized personnel.
- Report and identify any possible deviations to appropriate authority.
- Any doubt/s can approach the supervisors or other authorized personnel, if the Technical Support Executives has doubts about the organizational policies and SOPs.
- Precisely receive information and instructions from the supervisor related to one's work.
- This must be done to get a proper idea about the responsibilities expected by one's supervisor.
- Having a proper idea about one's tasks helps in fulfilling targets successfully.
- Address the problems efficiently and report if required to immediate supervisor appropriately.
- Receive instructions clearly from superiors and react effectively on the same.

4.1.2 Effectively Communicate with Clients

Outsourcing plays instrumental role in generating revenue. Multiple projects run at a time in a company and each project might have different clients with different requirements and expectations. Therefore, Client communication is a vital thing to know for a Technical Support Executive.

- Communicate and politely, clearly, precisely
- Empower the client by putting adequate value to his / her views
- Recognize the client as a "Partner" and not just "customer"
- Stay honest in dealing with customer
- Maintain contact and inform the client of current and upcoming deals and offers.

- Exceed client's expectations through impeccable deals and service
- Negotiate fairly, politely but firmly
- Know and learn about the client
- Resolve service issues and concerns promptly
- Empathize with the client and apologize, in case of grievance and complaint

Review the analysis results with appropriate people and implement modifications.

The job role of Technical Support Executive is dependent on the different technical aspects and the technology changes quite rapidly. To keep up with the pace, executives must take vital updates from concerned people. Seeking and following up for feedback is another way to increase the quality of work.

Good feedback help the organization increase the service provided. Moreover, implementation of good feedback earns the respect and trust of the clients.

It might happen that there are certain flaws and inaccuracies in the work done that need to be taken care of. Project Manager, Quality Assessor and immediate supervisor like the Team Lead are the most appropriate persons to review the performance.

A performance report is generated on a weekly or monthly basis. The parameters vary from company to company on which executives are evaluated. The report is then shared with the executives.

As a Technical Support Executive, one should accept the feedback in a positive way and work on the areas of weakness. The main reasons behind review results are mentioned below:

- Introducing the Technical Support Executive to the process flow so that he/ she gets familiar with the common or organizational practices.
- Marking the probable areas of weaknesses. However, the executives should view it as a “scope of improvement” on which he/ she must work on to develop into a stronger professional.

The parameters of review are:

- Grooming (Verbal and Non-verbal)
- Discipline and Integrity
- Time Management
- Team Work (how the executive is as a team player)
- Attendance and Absenteeism

Each company maintains a specific mode of evaluating performances of the employees. SMART (Star, Medium, Average, etc.) is used for performance reviews. Star performers are recognized and the persons who lag behind are equipped with facilities to enhance their performance. The employee should comprehend the process and requirement of the company and then groom himself/ herself accordingly. In some cases, SMEs or Subject Matter Experts are appointed to evaluate the performance of the employees.

Notes



UNIT 4.2: Significance of Healthy Team Bonding in Ideal Work Culture

Unit Objectives



By the end of this unit, participants will be able to:

1. Identify challenges and pain points related to work distribution while working in a team.
2. Explain the importance of distributing and sharing workloads.
3. Demonstrate how to carry out commitments they have made to colleagues.
4. Identify any issues they have working with coworkers and take the initiative to address these issues.
5. Discuss the importance of following the organization's policies and procedures for working with colleagues.

4.2.1 Understanding a Colleague's Problems and Providing Support

Inform Colleagues in Advance

Certain things, at times, lead to time constraints. For example, owing to the work pressure, one might need to stretch work hours. It not only becomes your responsibility but a humane approach to assist your colleagues when they are stuck at any project.

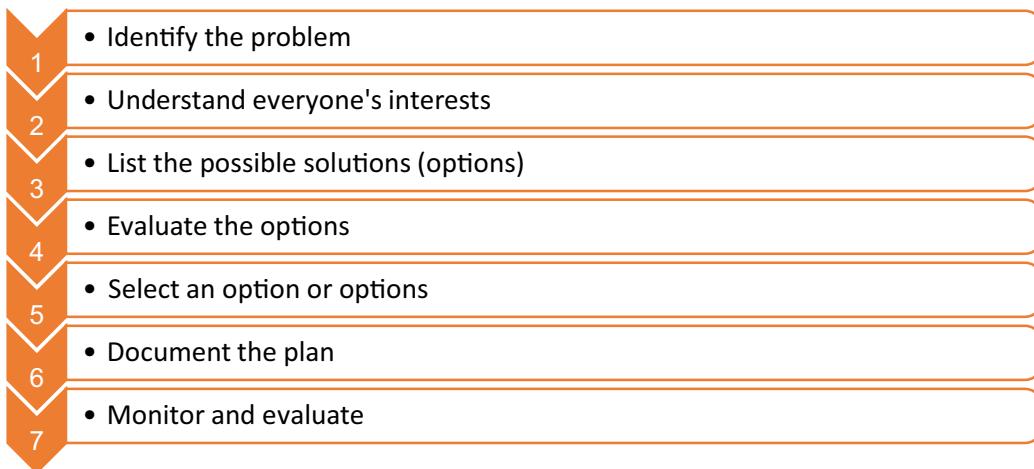
When you comprehend the perspective of your colleagues, you create good communication and mutual bonding between yourself and your colleagues.

It isn't essential that you can do every task that is given to you. There may be times when you will be shifted to another project based on priority. In such cases, it is better to let your colleagues know what is happening. This lets your colleagues to find an appropriate replacement that can carry on with the work you are initially supposed to do.

Time Management is about managing your time. It is about making a commitment to be more organized, uphold your focus and use your time to your advantage.

Identify concerns with coworkers and fix them

A Problem can be defined as a difficult or unexpected situation, regarded as unwelcome and needing to be dealt with and overcome. Problems can take the form of intricate puzzles and riddles.

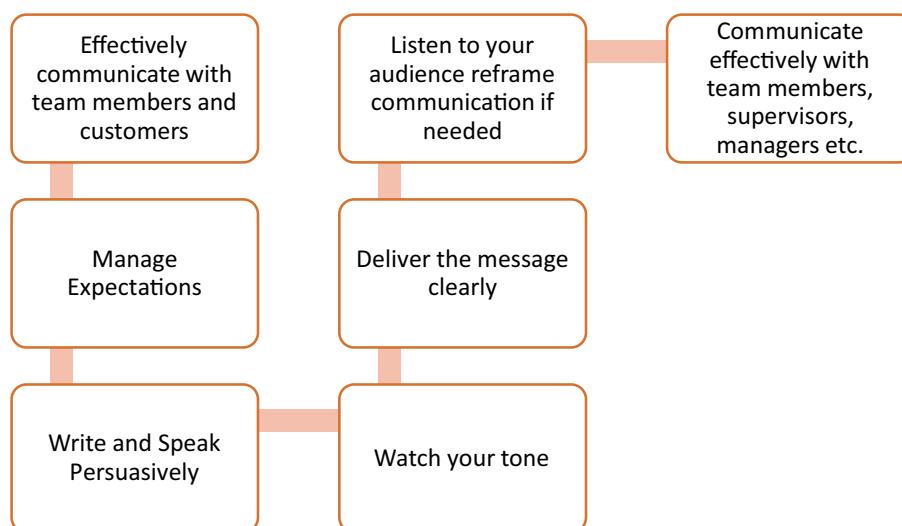
*Fig. 4.2.1. Stages of Problem Identification and Solving*

Solving Problems while ensuring health and safety at workplace

- Analyzing the situation and taking suitable actions while dealing with team members
- Analyzing, assessing and deploying the information gathered from observation, experience, reasoning, or communication to act efficiently
- Identifying flaws in software, tools and equipment and ways to resolve them on time
- Ensuring timely correction of errors for reducing rework

Follow the organization's guidelines for collaborating with coworkers.

A Technical Support Executive must connect and coordinate not only with clients, but with seniors and supervisors in the organization as well. The elements of communicating effectively with clients, peers / colleagues and supervisors are given below:

*Fig. 4.2.2. Essential Steps of Effective Communication*

A. Cooperate and coordinate with coworkers to accomplish work objectives

- Listen actively with minimal barriers
- Build trust, but do not get too casual
- Participate and coordinate
- Watch your body language
- Share best practices with peers
- Be aware of your tone
- Ask questions to clarify
- Discuss task lists, schedules and activities

B. Effectively Communicate with Supervisors

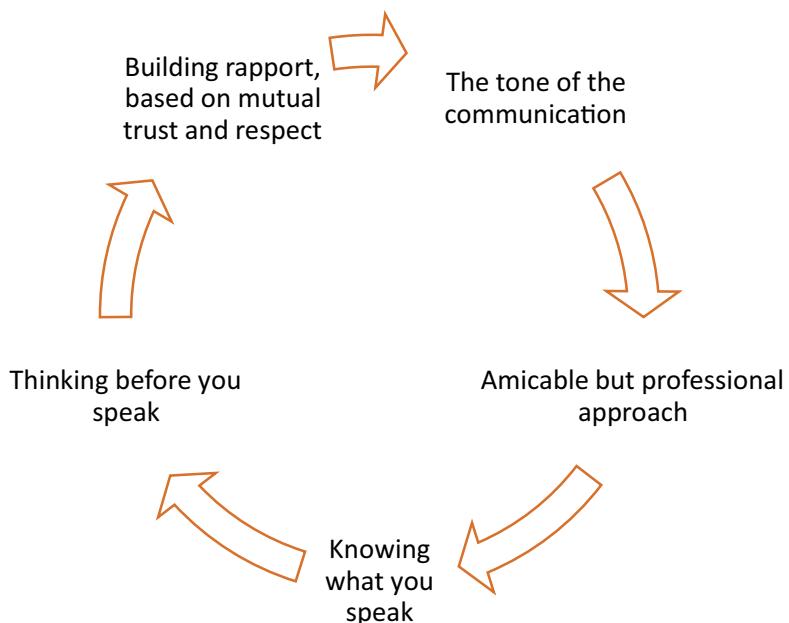


Fig 4.2.3. Essential Qualities for a Good Communication

According to the dictionary, a grievance is "a complaint or a strong feeling that one has been treated unfairly."

A. Follow the escalation matrix in the event of any complaint

- Before complaining about and expressing grievance, be very clear of the objectives, i.e. why do you need to complain and what do you want to accomplish in the long run
- Adhere to the Escalation Matrix for Internal Grievance Resolution

- Write an email to the designated official at each level of the matrix, according to the guidelines and formats provided.
- Follow up with the concerned official, if the grievance or complaint is not addressed within the standard TAT at that escalation level.
- Document all records of emails and phone calls until the issue is duly addressed and closed.
- If the concerned official, at a certain level, does not address the grievance within the TAT, escalate and carry forward the issue to the next level.
- Repeat process from 2-6.
- On resolution of the grievance, phone or email the concerned authority to thank them.

B. Addressing Worker's Grievance

- Hold an official yet private meeting with the worker.
- Acknowledge the grievance and empathize.
- Sustain confidentiality of the entire matter.
- Invite witnesses, if deemed absolute essential.
- Depending on the intricacy of the grievance, continue with further investigation.
- Obtain information to support your decision.
- Take the final decision.
- Escalate the matter to the immediately next level, if the worker is not satisfied with the decision taken.

C. Addressing Client's Grievance

- Do not contradict with or avoid the client from talking.
- Listen actively and patiently.
- Apologize and empathize with the client.
- Listen to the grievance / complaint with an open mind.
- Promise that you will get back to him / her with a permanent solution without delay.
- Keep your promise and respond to the client with a solution within the standard TAT.
- If you cannot address the issue on your own, escalate it to the next level.
- Follow up with the concerned officials till the grievance is addressed and the issue resolved.
- Let the client know over email or phone that his / her grievance has been taken care of.

Summary

- In all companies, departments like operations, management, and recruitment play a great role.
- One's supervisor is supposed to be one's mentor at work.
- Certain things, at times, lead to time constraints.
- A Technical Support Executive must connect and coordinate not only with clients, but with seniors and supervisors in the organization as well.

Activity



Activity 1: Con-Vid Session

- In this session, the Trainer will play 2 videos.
- The first video will be about 10 ways to build good relationships with your co-workers.
- The YouTube link for the video is: <https://www.youtube.com/watch?v=VLRMnPRJK6c>
- The other video will be about how to communicate with your co-workers.
- The YouTube link for the video is: <https://www.youtube.com/watch?v=B6h9QMBC9cw>
- The students will watch the video attentively with pin-drop silence.
- They must note down crucial and relevant points from the video.
- Students will maintain decorum in the class and will not talk, whisper or discuss in the class.
- In case of queries or doubts, students will write those down in their notebooks.
- After watching the videos, the students can ask questions to clarify doubts.
- The students will raise their hands before asking questions.
- The Doubt Clarification session will be in the form of a discussion round, where the answers can be given by either the Trainer or any of the students knowing the answer.

Activity 2: Role Play Session

- In this activity, the Trainer will divide the class few groups, depending on the batch strength.
- The first group will enact and showcase the incorrect method of communicating with colleagues.
- The second group will enact and showcase the correct method of communicating with colleagues.
- The third group will enact and showcase different methods of building a good work relationship with colleagues.
- The group portraying the given role in the best way will be declared the winner and will be appreciated in the class.

Exercise

A. Fill in the Blanks

1. _____ Communication allows us to understand the problems that our colleagues are facing.
2. In case of IT companies, _____ plays instrumental role in generating revenue.
3. Seeking and following up for _____ is another way to improve the quality of work.
4. A Problem can be defined as a difficult or _____ situation.
5. The employees can share the information through secure _____.

B. Answer the Following Questions

1. Why is it important to know the process of communication with clients?
2. How can a Technical Support Executive improve his/ her performance based on review?

Notes 

Scan the QR Code to watch the related videos



<https://www.youtube.com/watch?v=nYpMBBnB354>

Significance of Healthy Team Bonding in
Ideal Work Culture





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5. Maintain a Healthy, Safe and Secure Working Environment

Unit 5.1 - Different Types of Breaches in Health, Safety and Security and How and When to Report These

Unit 5.2 - Evacuation Procedures for Workers and Visitors

Unit 5.3 - Summon Medical Assistance and the Emergency Services, Where Necessary

Unit 5.4 - Health, Safety, and Accident Reporting Procedures and the Importance of These

Unit 5.5 - Government Agencies in the area of Safety, Health and Security and their Norms and Services



Key Learning Outcomes



By the end of this module, participants will be able to:

1. Analyze different types of breaches in health, safety, and security.
2. Explain the evacuation procedure.
3. Identify how to summon medical and emergency services.
4. Identify the method of health, safety and accident reporting.
5. Identify the Government agencies in the area of safety, health and security and their norms and services.

UNIT 5.1: Different Types of Breaches in Health, Safety and Security and How and When to Report These

Unit Objectives

By the end of this unit, participants will be able to:

1. Analyze different types of breaches in health, safety, and security.

5.1.1 Breaches in Health, Safety and Security and Accident Report

Some important points in the operations related to reporting and response related to safety breach are:

- Safety breaches in the designated premises are “Incidents” that need to be reported and duly responded to.
- Reporting a safety breach is done by providing an Incident Report.
- An Incident Report must comprise the following aspects:
 - The person/s involved (details of the offender/s)
 - What exactly happened
 - Number of casualties
 - Where it happened (location of the incident)
 - When did it happen (Exact time, when the incident took place)
 - Why it happened (factors that caused the incident; the holes and gaps in the existing security system)
 - Description, features, peculiar features and condition of the affected people, vehicles, properties, and goods

The common format of the Incident Report is given below:

INCIDENT REPORT		
Day/Night: _____	Date: _____	Time: _____
Report Writer (Print) Name: _____		
Co No: _____		
Company: _____	Section: _____	
Telephone no: _____	Extension: _____	
INCIDENT: (Summary: (Who, what, where, when, why, how, etc.) _____ _____		
ACTION TAKEN BY SECURITY: _____ _____		
RECOMMENDATIONS/COMMENTS/REFERENCES: _____ _____		
Copy to Client: _____	Date: _____	

Fig 5.1.1. Sample Incident Report Form

Notes



UNIT 5.2: Evacuation Procedures for Workers and Visitors

Unit Objectives



By the end of this unit, participants will be able to:

1. Demonstrate the process of evacuation.

5.2.1 Fire Safety

Perform Fire Evacuation Steps

The full form of EHS is Environmental Health and Safety. It is a discipline that studies and deploys the practical aspects of environmental protection and safety at work. Simply, it is what organizations and workshops must do to ensure that their actions do not cause harm to anyone.

The EHS commands that there must be specific escape routes or safety evacuation points. This includes thorough plans or blueprint of the building which is understandable to anyone.

Each floor of the workshop or building must have the Safety Evacuation Map. These are mainly applicable for cases of Fire outbreaks or natural calamities like Earthquake, Flood, etc.

The sequence of an Evacuation situation is given below:

1. Detection
2. Decision
3. Alarm
4. Reaction
5. The movement to an area of refuge or an Assembly station
6. Transportation

Office Building Emergency Evacuation Plan

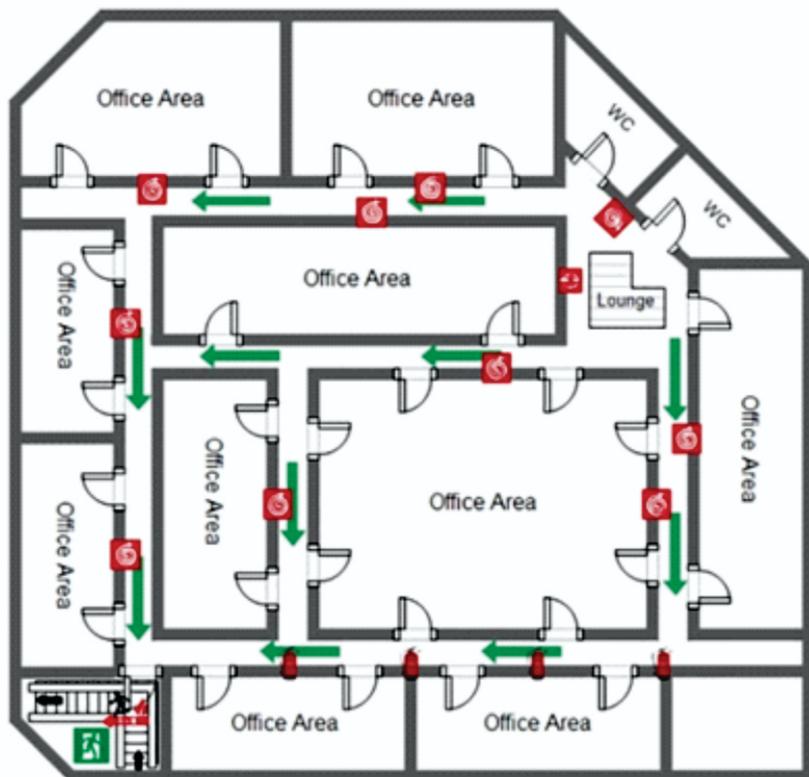


Fig.5.2.1 Fire Escape Plan

Carry out Evacuation of Casualty and Premises Tasks

Briefing and Guidance for Fire Fighters

There are basically three methods with the help of which people can be rescued from a building engulfed in fire. To ensure on-site reception, here are two of the important steps that must be taken into consideration. These come under the best safe carrying and lifting practices.

Conventional Technique

- This is a good method if there is an open area nearby.
- The first rescuers will make the victim sit reach under their armpits and grab their wrist.
- The other rescuer will cross the ankle (victim) and pull up that person's legs on his shoulder.
- Finally, on the count of 3, both will lift the person up and move out.

What to do during Bomb Threat?

- Don't be panic-stricken and try to keep your calm.
- Open the emergency exit gate so as to propagate the evacuation process.
- Think ahead and consider places where a bomb can be planted.
- Don't assemble in the common assembly area because terrorists want to kill as many people as possible. The common assembly area is the place where the evacuees assemble and therefore the possibility of killing a maximum number of people is in the common assembly area. Do not consider the common assembly area during the evacuation at the time of bomb threat. Always assemble at a place which is not premeditated.
- Inform the local police immediately.
- Evacuate immediately after receiving a bomb threat and don't wait until something is found after investigation.
- Document everything and submit the documentation to the concerned authority.
- If anything suspicious comes into sight, barricade it with red ribbon maintaining a diameter of 100 meters. Ensure that no one comes within the boundary. Bring sandbags and put them around the barricade to minimize the effect of the blast.
- Don't try to touch any suspicious object and wait for the police to arrive at the spot to diffuse it.



Fig.5.2.2 Proper Evacuation Procedures During Bomb Threat

For Fire Outbreak:

The emergency and evacuation procedures are given below:

- A clear passageway must be present to all escape routes.
- Signage like escape routes should be clearly marked.
- Don't use the Elevator during a fire.
- All people at the workplace must be given brief instructions about the positions of the escape routes.
- Enough exits and routes must be there for all people to escape.
- Emergency lighting (Infrared lights for night and blurred vision) must be present.
- Emergency doors, that open easily, must be present.
- Brief instructions must also be given regarding the availability and use of fire extinguishers.
- The workplace must have a safe meeting point or assembly area for the staff.

Correctly demonstrate rescue techniques applied during fire hazard:

1. Responding to Fire

- The Fire Alarm System must be initiated and an alert must be raised.
- The appropriate class of Fire Extinguisher must be chosen.
- A safe evacuation path must be identified before dealing with the fire.
- Immediate evacuation must be initiated if the extinguisher is exhausted and the fire still exists.
- Call the workplace security or the local emergency services.
- Summon the fire-fighting services at the earliest.
- Look out for the nearest emergency exit routes and call out for people, who you can take along with you.
- Always use a staircase and not the elevator.
- While opening a door, first touch the door with the back side of your palm.
- The P.A.S.S technique must be adopted for extinguishing the fire.
- Always move downstairs and avoid returning to the burning premises, till the fire-fighters arrive.
- As you move out of the building, gather people, whoever you come across.
- Stay as far as possible from smoke, because smoke may comprise toxic gases.
- Cover your mouth and nose with a damp cloth to protect yourself. If possible, help your colleagues (those who are with you) to repeat the same.
- Keep doors open, after you open them.
- Start moving out of the building and ask your colleagues to do so.
- Do not rush.

2. Initiate Evacuation

- Stop your work and move out safely and without spreading panic.
- Carry only the most important items like cell phone.
- Await instructions from the Safety Committee.
- Leave the workplace from the nearest door bearing an “Exit” sign.
- Report to the designated Assembly Area.
- Incorporate first aid treatment to anyone in need.

For Natural Calamities / Disasters:

2. Flood and Storms

The emergency and evacuation procedures are:

- Move to the high grounds and help others move before the flood strikes
- Stay alert, avoid panicking and monitor the surroundings with eyes and ears open
- Accumulate disaster supplies like:
 - Canned, dry, ready-to-eat and packaged food, which do not require refrigeration or cooking
 - Liquid cash
 - Drinking water in clean containers
 - First Aid Kit
 - Adequate batteries
 - Flashlights
 - Essential clothing
- Instruct people around you not to drive.
- Shut off the Mains Supply (electricity) at the circuit breakers.
- Do not walk or swim through the flooded water.
- Stay alert for evacuation calls and help people identify alternate routes of getting there.

3. Earthquake

The emergency and evacuation procedures are given below:

- Inform others in the area by raising an alarm if they have not heard it while you are evacuating yourself.
- Quickly shutdown any hazardous operations or processes .
- Exit the room.
- Take jackets or other relevant clothing material needed for protection from the weather.
- If possible, close windows and doors as you leave, but avoid locking the doors and emergency exit routes.
- Exit the building and walk to the nearest safe exit route.
- Do not run.
- Do not use elevators.

For Accidents:

The emergency and evacuation procedures are:

- Summon emergency medical help by ringing the Safety Committee officials or the toll-free number.
- One must inform the immediate supervisor about an injury or illness.
- Check and examine the site, to gather as much information as possible, so that the same can be provided to the emergency team, once it arrives.
- One must extend help and assistance to others.
- If possible, workers may treat themselves to first aid or ask colleagues to do so.

The general steps involved in carrying out an evacuation are:

- Stop your work and move out without spreading panic.
- Gather and carry only the most important items like cell phone.
- Report to the designated Assembly Area.
- Leave the workplace through the nearest door bearing an "Exit" sign.
- Await instructions from the Safety Committee.
- Incorporate first aid treatment to anyone in need.

Evacuation and emergency procedures for the especially abled:

- With Impaired Hearing
 - o Turn lights on/off to gain the person's attention, or specify directions with gestures, or write a note with evacuation directions.
- The Visually Impaired
 - o Announce the type of emergency.
 - o Offer your arm for help.
- People with Prosthetic Limbs, Crutches, Canes, Walkers, etc.
 - o Evacuate these individuals along a route specially designated as injured persons.
 - o Accompany and assist to evacuation site if possible.
 - o Notify emergency crew of their location.
 - o Use a sturdy chair, or a wheeled one, to move the person to an enclosed stairwell.

Notes



Scan the QR Code to watch the related videos



https://www.youtube.com/watch?v=x_IAR8GXf_k

Evacuation Procedures for Workers and visitors

UNIT 5.3: Summon Medical Assistance and the Emergency Services, Where Necessary

Unit Objectives



By the end of this unit, participants will be able to:

1. Identify how to summon medical services and emergency services.

5.3.1 Respond to Emergency Situation

How to Respond to an Emergency Situation

An Emergency can be defined as “a serious, unexpected, and often dangerous situation requiring immediate action.” Responding to an Emergency situation while working at the site involves the given steps:

Undertake first aid activities in case of any accident, if required and asked to do so.

- First Aid is an emergency care or treatment given to an ill or injured person before regular medical aid can be acquired.
- Before administering First Aid to a victim, one must check the category and degree of emergency and then apply the techniques accordingly.
- Stop and take a look at the scene, and the person before reacting.
- Ask yourself the following questions:
 - What is the casualty?
 - What happened exactly?
 - What is the category and nature of the emergency?
 - Is the accident dangerous for the victim?
 - Is anyone else available at the place to assist?
- Do the following if the victim is conscious and injury is not dangerous:
 - Ask for the victim’s consent before providing first aid.
 - Use appropriate PPE, if possible.
 - Interview the victim to ask basic medical questions, so that accurate information may be provided to the Emergency Medical Team, once it arrives.
 - Conduct a thorough check for unnoticed injuries.
 - Ensure appropriate care and technique.
- If the victim is unconscious, try reviving the person by addressing him / her, rubbing shoulders, hands or the sole of feet.
- Use the AED and use it, along with Artificial Respiration.

Report hazards that you are not competent enough to deal with to the relevant person in line with the organizational procedures and alarm others who may get affected.

- As an important part of the emergency management procedure, any workplace must designate a Safety Committee, which comprises liable and senior people from all departments and teams.
- This committee would act as the legislative body, the authority and the first point of contact for reporting any hazard, potential risks / threats and emergency situations in the workplace.
- This committee would also be liable to conduct training sessions, safety audits, and drills, to help all employees prepare themselves for emergency and unprecedented situations.
- The list of the committee members, their designations and job titles, as well as contact numbers, must be listed and circulated among the employees.
- The Safety Committee must comprise important members from the following departments:
 - Supervisor/Manager/Team Lead from each project
 - Security Services
 - Building Operations and Maintenance team
 - Counselling and Psychological Services team
 - Emergency Medical Services
 - Reception/Front Desk
- This list must be put up for easy display at popular parts of the workplace, in the form of an Emergency Escalation Matrix and must be updated daily.
- Furthermore, this list must be mandatorily included in every First Aid kit in the workplace premises, so that a person treating a victim with first aid techniques may call for additional help and report the accident.

Practice no Loss for Company Due to Safety Negligence

Safety negligence at the workplace or even at home can prove to be lethal to the individual. So to ensure that there no chances of safety carelessness, companies should follow these aspects:

- The companies should ensure that the wiring in the workplace is insulated.
- No malfunctioned machinery should be kept with the new or spare ones.
- No sharp objects or equipment are kept on the walkway.
- First aid kit should be kept either at the reception or in a separate medical supply area.
- There are no open or damaged sockets.

Practice regular safety drills for being prepared in the event of a fire or natural calamity

- The first step in this process is to raise the alarm as all companies and workshops do have push-glass fire alarm system. Breaking the glass and pushing the alarm button should be the first step to let the people know that the building is on fire.
- On hearing the emergency evacuation alarm, the foremost thing that a person must do is cease and wind up all activities and look for an exit path.
- The next should be to find out the place where the fire started.
- It should be followed by tackling the fire with an appropriate fire extinguisher.
- Meanwhile, a person from that workshop or building should call for emergency help services like ambulance and fire brigade officers.
- People should take the stairs to get out of the office building instead of using the lift.
- Every company should keep folding wheelchairs so that company employee or even visitors can transport individuals with severe mobility impairments or health.
- It is important that all individuals emptying the building should be calm and composed.

The method of using a fire extinguisher is to follow the method: P.A.S.S.

PASS is the acronym for:

- Pin (P)
 - Aim (A)
 - Squeeze (S)
 - Sweep (S)
1. To use an extinguisher in a proper way, the first step is to pull the handle's pin
 2. The next step is to aim the extinguisher's nozzle. The direction should be toward the fire's base. This is because the sprayed foam at the top will diminish or extinguish only the fire at the top. This will not serve the purpose for which the extinguisher is used and the burned down flame may spring up to life if it gets enough oxygen or any combustible material.
 3. Then in an extremely controlled manner, you need to release the agent. This is done by squeezing the trigger.
 4. You already know that you should direct the nozzle at the fire's base. You must sweep the extinguisher's nozzle from left to right. Continue with this process until you put out the fire as you need to act fast as most extinguishers' discharge time is nearly 10-20 seconds.

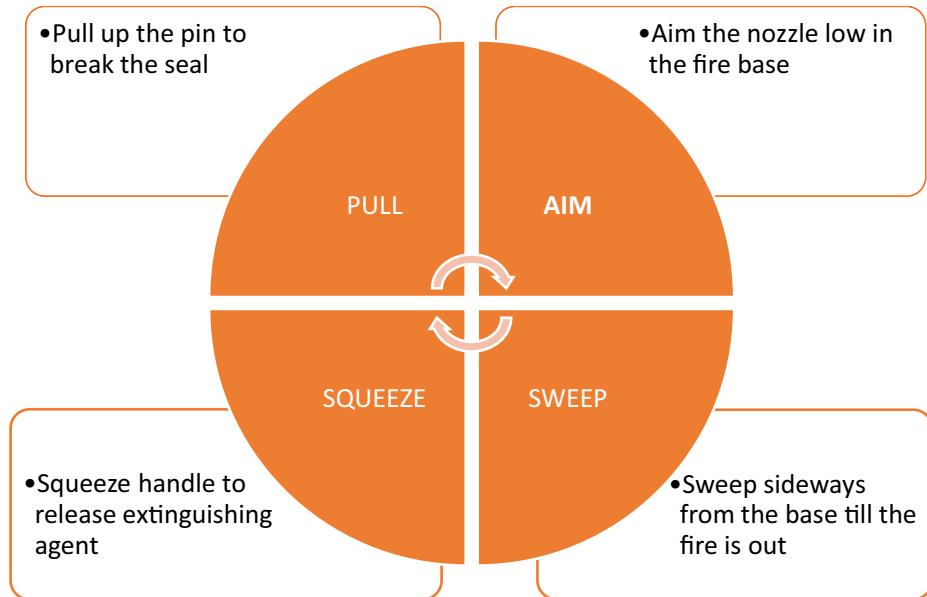


Fig. 5.3.1 P.A.S.S Technique for Fire Fighting

Participate in Emergency Procedures

- **Raising Alarm:** Fire Alarms may either have a “Break Glass” or a “Pull / Push” mechanism. In case of the break glass system, the glass sheet must be forcefully hit with a clenched fist. One must continue repeating the process until the glass breaks. In case of the “Pull / Push” systems, one must break the glass first and then either pull down or push up the lever to raise the alarm.
- **Correct Assembly Point:** Proper instructions must be given to the workers about the site of and the directions to the correct assembly point in the workplace. Information about this must be given during mock evacuation drills and training sessions as well.
- **Safe and efficient evacuation:** Suitable evacuation procedures must be adopted for the common public and for especially abled persons. Specially-abled persons must be helped to evacuate the place by giving them access to Wheelchairs and other aids.
- **Roll call:** Once everybody has evacuated the building / workshop and arrived at the Assembly Point, Roll call or Head Count must be done to ensure that nobody is left behind in the affected area. This must be done mandatorily to ensure that everybody on the premises is safe.
- **Correct return to work:** Evacuation must be conducted in a very streamlined, organized, and noiseless manner. Likewise, everybody, who had evacuated the workplace, must return to his / her respective locations / positions / seats, following normal or emergency routes, depending on whether the situation has been re-established to normal or not. Once everybody is back in place, another Roll call is taken.

Demonstrate How to Free a Person from Electrocution

Electrocution is injury or death caused due to electric shock. The following steps must be adopted while freeing a victim from electrocution:

- **Approach**

- o The first step is to approach the spot to find out if you run the risk of electrocution as well.
- o Call for help from a colleague, who is trained in treating electrocution victims.
- o Inspect the accident scene to ensure if the source of electrocution is still active.
- o Inspect if the victim is still in contact with the source of shock.



Fig. 5.3.2 Approach the Victim and Inspect the Accident from a Safe Distance

- o Detach the main power supply of the area.
- o Dodge any electrical conductors in the surroundings.
- o Touch the victim only if all power sources have been deactivated.



Fig. 5.3.3 Disconnect the Source of Power

- o In case it is impossible to deactivate the power supply, the victim must be removed from the location of the live power source.
- o This should be done by wearing appropriate PPE.

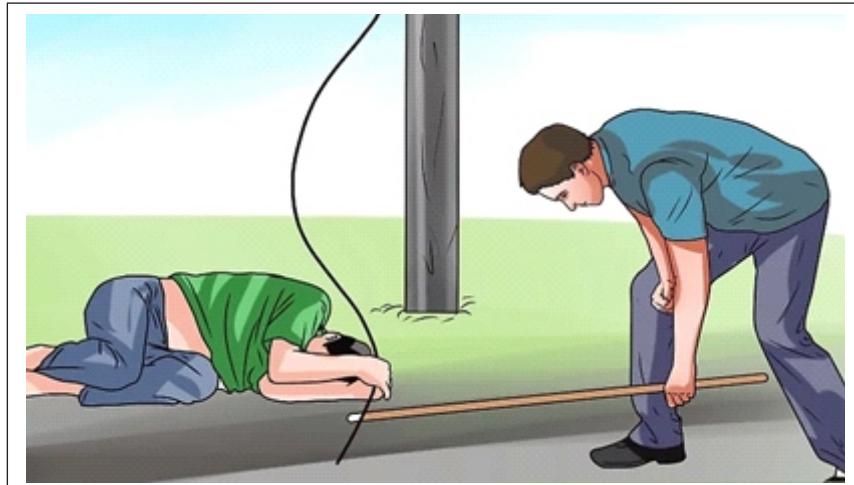


Fig. 5.3.4 Use Insulators to Approach the Victim of Electrocution

- o The victim must not be removed in case of neck or spine injury.
- o The area must not be crowded so as to allow sufficient breathing air.
- o The victim's pulses and breathing rate must be checked.
- o CPR may be provided if required.



Fig. 5.3.5 Perform CPR if Required

- o Never touch the victim or the surroundings without detaching the main power supply.
- o Wear appropriate insulating gloves and shoes in order to protect yourself from electric shocks.

Notes



UNIT 5.4: Health, Safety, and Accident Reporting Procedures and the Importance of These

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss the method of health, safety and accident reporting, and the evacuation process.

5.4.1 Emergency Procedure and Reporting Accident

Follow the organization's emergency procedures quickly, efficiently and calmly

Evaluating the Emergency

- One must rationally and critically think and assess the severity of the emergency and determine, what requires to be done on an immediate basis.
- One must remain calm and composed during an emergency situation since stress during an emergency complicates things and may confuse a person.
- The emergency dispatcher aims at providing instant and appropriate help based on the nature and degree of emergency.
- One must look for additional help by calling up the emergency toll-free number, which would help the caller reach an official or 'dispatcher'.
- One must help the dispatcher by answering his / her questions and providing the dispatcher with the precise location and nature of the emergency.
- It is suggested that one should call from a GPS equipped phone so that the dispatcher is able to track the location, even if the caller is unable to speak.
- One must be aware of the nature of the emergency, i.e. whether it is a medical, mental health or behavioral emergency.
- One must evaluate the immediate threats, for example, in case a person is severely injured from a running machine, the machine must be turned off instantly to prevent others from getting hurt as well.

Handling the Emergency

- Extremely high casualties must be informed to the Occupational Health and Safety Committee (OHSC).
- One must move farther from the emergency spot and help others follow the same.
- Secondary Hazards must be removed or mitigated, at least. For example, a car accident comprises the risk of a violent explosion and fire outbreak resulting from spilled fuel.
- One must not feel guilty if nothing can be done to help the others.

- In case nothing can be done to lessen the severity of the situation, one must provide support to the others by uplifting them mentally, inquiring about their medical history, noting events as they occur, etc. This information may prove vital for the emergency response team.
- One must help the other victims and take suitable measures to assist the specially abled ones.
- One must refrain from moving a severely injured victim and provide only the basic first aids.
- Once the emergency team arrives, assist them with all required and relevant information.
- A First Aid kit must be used if required.
- One must try reviving a seemingly unconscious victim by rubbing the chest, pinching the earlobes, providing Cardiopulmonary Resuscitation (combination of chest compression and artificial respiration).

Accident Report		
Child Information		
Name Parents Address	Age Work Phone	Gender Work No. Email
Time Frame		
Date	Time	Location
Description of Events		
<hr/>		
Actions Taken		
Responder Name Were Parents Contacted? Parent Contacted Was the Child taken to a Hospital? Method of Transport	Description of Aid How? Who Contacted Which Hospital?	Time
Additional Information		
<hr/>		
Supervisor Name _____		Signature _____
Date _____		

Fig. 5.4.1 Sample form of Reporting Accidents

1. Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines

- Ensure that all emergency route maps are on display in the accessible places on all floors of the building.
- Ensure that appropriate Fire Extinguishers are present on all the floors of the workplace.
- Learn and abide by company policy and procedures for dealing with security risks in the establishment.
- Ask your supervisor how you may retrieve PPE and its maintenance and storage.
- Stay aware that confined spaces must bear suitable signs, to restrict claustrophobic people from accessing them.

2. Ensure that health and safety instructions applicable to the workplace are being followed

- Lighting should be satisfactory in all areas and additional bulbs should be kept handy.
- While using cutting tools, the direction of cutting should always be away from your body.
- Arrange for frequent Safety Drills and Trainings for employees to endorse safety awareness.
- Ensure that all manual cutting tools must be honed in advance because blunt tools may slip and lead to deep cuts.
- Have a clear idea of how much authority and accountability you have to deal with security risks, including your legal rights and duties.
- Learn and abide by company policies and procedures for maintaining security while you work.

3. Check the worksite for any possible health and safety hazards

- Employ a Safety Supervisor in the workshop.
- Have your employer develop a daily checklist for all areas delegated to suitable employees.
- This Safety Supervisor will stay accountable for checking the worksite for potential health and safety hazards.

4. Follow manufacturers' instructions and job specifications relating to safe use of materials specifically chemicals and power equipment

- Ensure that all Chemical Solutions used on display shelves or for Housekeeping purposes must be used only after mentioning to the relevant MSDS (Material Safety Data Sheets) or Instruction Manuals.
- Loosely fitted clothes must be totally avoided because the loose ends may get caught in powered machinery and tools and may be lethal.
- Ensure that you read the Instruction Manual thoroughly before using powered tools and equipment.

5. Follow electrical safety measures while working with electrically powered tools & equipment

- Powered tools and equipment must be reviewed for any damage, before and after every use.
- Damaged switches must be reported to the supervisor and repaired with immediate effect.
- Plugs must be checked for missing or faulty prongs / pins.
- The power cord must be assessed carefully for any fraying, faults, cracks or loss of insulation.

6. Ensure safe handling and disposal of waste and debris

- All walkways should be free of clutter and debris, to avoid trips and falls.
- Any spill should be cleared off instantly and 'Wet Floor' or 'Work in Progress' signs should be used in suitable places.
- Store equipment, Tools and Chemicals should be stored correctly, abiding by all instructions provided in the Instruction Manual and 'Directions for Use'.

Ensure electrical safety compliances and EMI/EMC hygiene requirements are met as per the guidelines

The risks associated with the use of electrical equipment are extended to both the user and his / her surroundings in the workplace. Few of such risks are mentioned below:

- Lethal Electrocution accidents.
- Non-fatal electric shocks leading to serious burn injuries.
- Non-fatal yet severe shocks leading to damages caused to the internal tissues and vital organs like the brain and the heart.
- Non-fatal yet painful static electric shocks.
- Falls from cranes, ladders, and scaffolding and resulting mechanical injuries due to electric shocks.
- Explosions and fire outbreaks caused by the sudden ignition of flammable materials.
- Health issues like nausea, muscle spasms, unconsciousness, and palpitations.

Identify and modify any hazards that you can deal with competently, safely and within the limits of your authority

1. Safety

- Operational safety
 - Employee safety
 - Building and plant safety
 - Process safety
 - Accident prevention
 - Emergency management
 - Risk management

- Safety of chemicals and biological materials
 - Handling
 - Safety data, documentation
 - Storage
 - Transport

2. Security

- Personnel
- Products
- Knowledge
- Physical assets
- Information (not covering core IT security like data access control, firewalls, virus Protection etc.)

3. Health

- Health protection at the workplace
 - Industrial hygiene
 - Occupational medicine
 - Accident prevention
 - Noise
 - Occupational toxicology
 - Stress, mental health
 - Biosafety
 - Ergonomics
 - Radiation protection

4. Health Promotion

Environmental Protection

- Emissions
 - Into the air
 - Into the soil
 - Into the water

- Waste
 - Avoidance
 - Disposal
 - Re-use, recycling
- Resources, including energy
 - Change to best alternatives
 - Eco-balance
 - Efficient use

Remediation of Existing Contamination

The management of SHE issues should be organized and clearly communicated. For this reason, it is ideal to encourage the use of a framework that includes each of the basic steps in a management cycle.

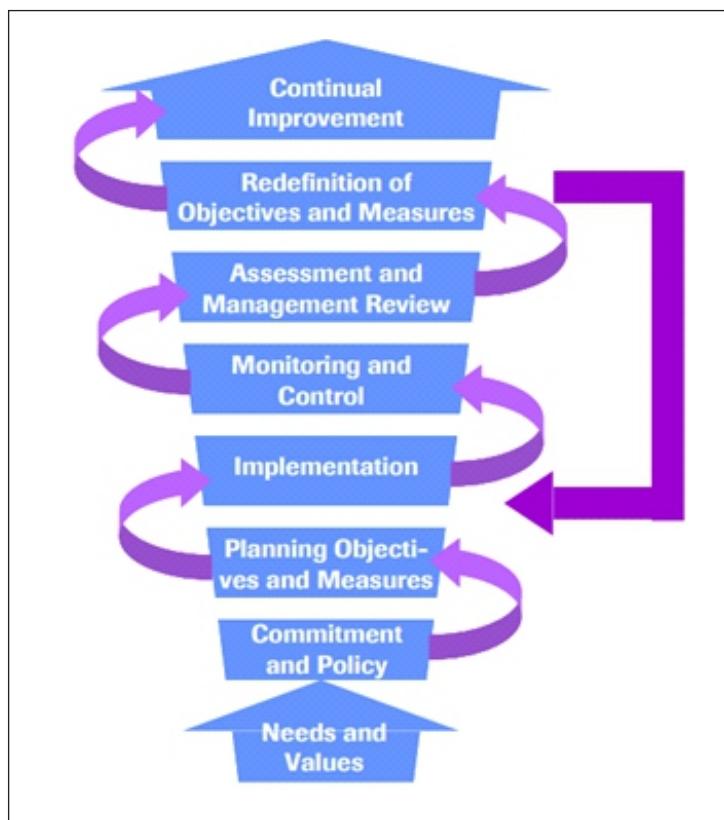


Fig. 5.4.2 Step-by-Step Evaluation and Implication of SHE Aspects

Notes



Scan the QR Code to watch the related videos



[https://www.youtube.com/watch?
v=bsafBtbJmrk](https://www.youtube.com/watch?v=bsafBtbJmrk)

Method of Health, Safety, and Accident
Reporting

UNIT 5.5: Government Agencies in the area of Safety, Health and Security and their Norms and Services

Unit Objectives



By the end of this unit, participants will be able to:

1. Evaluate the safety and emergency readiness of the site.
2. Identify and rectify any hazards that can be dealt with competently, safely, and within the boundary of authority.
3. Identify and recommend opportunities for improving health, safety, security to the designated person
4. Explore the process of completing health and safety records legibly and accurately.

5.5.1 Government Agencies for Safety at Workplace

Identify and recommend opportunities for improving health, safety, security to the designated person.

Hazard and Operability (HAZOP) Study

- This technique involves a structured and methodical examination of an present method / procedure, thus, in turn, classifying and assessing the associated hazards.
- These hazards can be easily recognized in the form of Deviations in the process parameters (physical conditions and elements like flow, temperature, pressure, humidity, etc..)
- A Deviation is a manner in which the process conditions stray away from the probable values.
- The severity of Deviation can be illustrated with the help of specific and prearranged Guide Words

The steps involved in conducting HAZOP are:

- Segregating the entire system or process into components or sections
- Select a study node or point
- Define the predictable outcome or consequence
- Choose a process parameter, based on the expected consequence
- Use a suitable Guide Word
- Find out the Cause behind the deviation
- Start with the cause that may lead to the worst possible consequence
- Evaluate the deviations thus detected
- Plan and prescribe action
- Record and document information
- Repeat the process from B

Common examples of process conditions / parameters are given below:

- Temperature
- Pressure
- Flow
- pH value
- Signal
- Mixing
- Viscosity
- Time
- Control
- Separation
- Addition
- Reduction
- Communication
- Sequence

Creating reports with comprehensive information is a must for every organization. The main idea behind this is to let the management body of the company as well as HSE to know the hazards at the workplace.

With the help of such reports, the company can examine, pinpoint the risks, and carry on the essential improvements within the organization. Because of such reports, companies can recognize long-term risks and short-term risks and achieve remedial actions for those risks.

In case of security-related issues or health-related issues, it is always a better choice to inform your supervisor or seniors.

A company can function in a systematic, smooth and successful way if it looks after the satisfaction of its employees. OH & S is one of the safety platforms where every corporation has to meet the safety guidelines.

Three specific articles (as per Indian constitution) ensure occupational safety and health for workers. Those Articles are:

- 42
- 39(e and f)
- 24

Some government agencies that look into the safety and security of individuals at the workplace are follows:

- Labour Departments (for both UT and State)
- Ministry of Labour
- Government of India
- NSCI (National Safety Council of India)
- National APELL (Awareness and Preparedness for Emergencies at Local Level)

Complete Any Health and Safety Records Legibly and Accurately

1. Health and Safety File

- These are electronic files that contain all the central safety and health records of the business. The other information kept in this file are given below:
- Copies of Risk assessments which covers the areas like:
 - Lifting operations
 - Lifting equipment
 - Manual Handling operations
 - Fire risk assessments
 - Lone working
 - COSHH (Control of Substances Hazardous to Health) assessments
 - General risk assessments
 - Risk of violence and aggression
 - Display Screen equipment workstation assessments
- For Organisation Health and Safety Risk Assessment, maintenance of risk assessment registers
- Copies of safety and health policies, guidance and procedures (local)
- Copy of the organization's Health and Safety Codes
- List of individuals (name) who are given the liability of examining the safety and health issues. They may be like:
 - Union Health and Safety Representatives
 - Risk assessors
 - Fire evacuation officers
 - DSE (Department of Sustainability and Environment) assessors
 - First Aiders

2. Log-book for Health and Safety

This involves:

- Risk assessment
- Training to overcome such situations
- Fire drills

Some other health and safety are:

- Information based on organizational meeting with Area Health and Safety Committee
- Annual safety and health audit checklists and applicable action plans
- Checklists for safety and health induction
- Copies of Safety Matters like an official newsletter
- Health and safety training records that have information regarding:
 - Name
 - Date
 - Health and safety training's course title
 - Response like Attended or Not Attended
 - Date fixed for Junior Software Developer training
- Fire Drill Records
- Examination and statutory inspection reports
- Material Safety Data Sheets
- Equipment maintenance and their service provision
- Record of dates for repeat of test, Portable Electrical Appliance tests and remedial action required
- Details related to emergency procedures

Summary

- Safety breaches in the designated premises are “Incidents” that need to be reported and duly responded to.
- The full form of EHS is Environmental Health and Safety.
- The first rescuers will make the victim sit reach under their armpits and grab their wrist.
- Information based on organizational meeting with Area Health and Safety Committee.
- One must rationally and critically think and assess the severity of the emergency and determine, what requires to be done on an immediate basis.
- First Aid is an emergency care or treatment given to an ill or injured person before regular medical aid can be acquired.

Activity



Activity 1: PowerPoint Preparation Activity

- The name of this activity is “PowerPoint Preparation” activity.
- In this activity, the Trainer will divide the class into few groups depending on the batch strength.
- Each group will be given 3 different topics on which they have to provide a broad explanation.
- Group A will write on the value of reporting accidents.
- Group B will write on Evacuation procedures.
- Group C will write about the correct method of firefighting.
- It is important that the Trainees present their answers not only rich in information but also supported by diagrams.

Activity 2: Evacuation Drill – Mock Practice

- This activity is in the form of “Evacuation Drill and Quiz Contest”.
- The trainer will ask the trainees to practice evacuation drills. The trainer should guide them.
- After the evacuation drill is complete, there will be a quiz contest on the evacuation procedure.
- The trainer will conduct the quiz contest.
- The trainer will divide the entire class into two group.
- One group will be Team A and the other will be Team B.
- There should be a scorer to write points on the board.
- The trainer will ask questions from the book related to the topic discussed.
- For each correct answer, there will be 10 points, however, for wrong answers there will be a deduction of 10 marks.
- There will be 5 marks for each right answer given on a pass and 15 marks will be deducted in case the pass answer is wrong.
- There is no negative marking if a question is passed without any answer given.

Exercise

Choose the correct option from the list of responses to answer the following questions:

1. Find the odd one out in terms of the given statement:

The supervisor or the manager should see and identify the type of breach. It is only on the basis of the severity of the breach the appropriate actions can be taken. The actions can be like:

- a) Dismissal
- b) Felicitation
- c) Warning

2. An emergency is –

- a) Unexpected
- b) Anticipated
- c) Predictable

3. OHSC stands for –

- a) Organizational Health and Safety Committee
- b) Occupational Health and Safety Community
- c) Occupational Health and Safety Committee

4. Most fire extinguishers' discharge time is near -

- a) 15-20 seconds
- b) 10-20 seconds
- c) 30 seconds

5. Which one of the followings is not a P.A.S.S component?

- a) Aim
- b) Sweep
- c) Shot

6. EHS stands for –

- a) Environmental Health and Safety
- b) Emergency Health Security
- c) Emergency Health and Safety

7. Flood is a –

- a) Natural phenomenon
- b) Artificial phenomenon
- c) Cosmic phenomenon

8. During an emergency evacuation, employees should adjourn at –

- a) Nearest police station
- b) Nearest fire station
- c) Assembly area

9. Nobody should use the _____ during fire.

- a) Stair
- b) Exit door
- c) Elevator

10. As an important part of the emergency management procedure, safety com a _____ Committee.

- a) Security
- b) Safety
- c) Health

Notes 





6. Workplace Data Management

- Unit 6.1 - Basics Of Data And Information Management
- Unit 6.2 - Follow the Accurate Process Flow to Analyse Data
- Unit 6.3 - Generate Report Based on the Observations



Key Learning Outcomes



By the end of this module, participants will be able to:

1. Describe how data / information can be managed effectively.
2. Discuss the basics of data and information management.
3. Explain the accurate process flow to analyse data.

UNIT 6.1: Basics of Data and Information Management

Unit Objectives



By the end of this unit, participants will be able to:

1. Discuss and agree with appropriate people the data/information they need to provide.
2. Collect the data/information from reliable sources.
3. Compute the accuracy and completeness of the data/information.

6.1.1 Data/ Information You May Need To Provide Including the Sources and How to Do This

Obtain the data/information from reliable sources and Check that the data/information is accurate, complete and up-to-date

Before starting any new process, it is important that a Technical Support Executive has a proper briefing of the process. Additionally, it is also significantly important that he or she is given all the data, required materials and their sources.

The required information involves:

- Collecting essential requirements and analysis of those.
- Any specific implementation procedure.
- The client/s requirements.
- Software related to the new process.

6.1.2 Templates and Formats Used for Data/Information

Templates are standard formats for documenting observations. The observation includes various aspects of the company. The type or the key parameters of the template change depending on the department. For instance, the template that is used by the transport department of a firm should be entirely different to that of the technical department which take care of operations.

The information provided in the template is used for performance examination.

Different techniques used to obtain data/information

- **Case Studies**

This method basically maintains that the information that is collected is based on the experience of the clients.

- **Focus Groups**

This data or information method is reliant on group discussions with in-depth topic assessment. This can be about marketing tactics, evolutionary aspects related to data, their sources, and searches, codes, programming languages or even any form of bugs.

Notes



UNIT 6.2: Follow the Accurate Process Flow to Analyse Data

Unit Objectives



By the end of this unit, participants will be able to:

1. Demonstrate how to carry out rule-based analysis of the data/information, if required.
2. Identify who to go to in the event of inaccurate data/information and how to report this.

6.2.1 How to Carry Out Rule-Based Analysis on the Data/Information

The rule-based study practically involves decision-making process or conditional branching. It is a design of methodology production whose basis lies in software factors - analysis of techniques to make appropriate decisions for a new project.

In this rule, we will find the presence of three or more conditions like pseudo codes or if statement. The performance requirement is the accommodation of rule engine solution.

Process of Application

1. Select the input variables

As there are many variables present in a new project, creation of a matrix is essential between methodologies and factors. We can see the presence of factors in methodologies.

2. Bad Sub Rules

There are certain types of factors that cannot be connected with other types of factors. If they are combined, this step cannot lead to the creation of bad sub rules. In this case, two rule categories are recognised. They are:

- System rules with high requirement stability, low complexity and small size system.
- System rules with low requirement stability, medium complexity and size system.

3. Variable Reduction

These factors are identified but their elimination doesn't make any impact. These generally comprise application domain and project type.

4. Category Merge

For methodology identification, formation of many categories takes place and its foundation can be on project type.

5. Examples

We can see the beginning of hypothetical example sets if we look at extreme cases. The rule-based analysis is based on the acknowledgment of factors like less complexity, high requirement stability, and small size.

How to report inaccurate data/information

In an organisation, the power structure often consists of a single or small group at the top and increasing levels of power below them. The majority of enterprises, governments, and organised religions are hierarchical organisations with varying levels of management, power, or authority.

Notes



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[https://www.youtube.com/watch
?v=9CYabKjCx3U](https://www.youtube.com/watch?v=9CYabKjCx3U)

Rule Based Analysis

UNIT 6.3: Generate Report Based on the Observations

Unit Objectives



By the end of this unit, participants will be able to:

1. Review the accuracy of work, involving colleagues where required.
2. Identify any unresolved anomalies in the data/information to appropriate people.
3. Produce complete, accurate and up-to-date data/information to the appropriate people in the required formats on time.

6.3.1 Provide Complete, Accurate, Up-to-date Data/Information in Required Formats on Time

Check the accuracy of work, involving colleagues and the formats in which you need to provide it

Every project has a stipulated timeline. A project commences with setting a goal followed by other aspects like developing, testing, and quality analysis and final deployment.

Set-up Goals

Every stage has its own format where information has to be filled in precisely. A project goal template must be implemented and details must be filled in regularly. A sample format is given below:

For methodology identification, formation of many categories takes place and its foundation can be on project type.

PROJECT GOAL AND OBJECTIVES WORKSHEET				
PROJECT NAME DATE CREATED	VERSION DATE	PROJECT MGR. VERSION NO.	0.0.0	
TEST GOALS & OBJECTIVES AGAINST SMART CRITERIA SPECIFIC • MEASURABLE • ACHIEVABLE • RELEVANT • TIME-BOUND				
GOAL STATEMENT				
OBJECTIVE NO.	An objective should look like this: "To increase the native plants between 1st and 3rd Streets by 50% by March 31st."			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Fig 6.3.1 Project goal template

Summary

- Before starting any new process, it is important that a Technical Support Executive has a proper briefing of the process.
- The rule-based study practically involves decision-making process or conditional branching.
- Every project has a stipulated time line.
- Every stage has its own format where information has to be filled in precisely.

Activity



Prepare Mock Reports

- The trainer will divide the class in few groups depending on the strength of the batch.
- The trainees will prepare mock reports on the shared format.
- The trainer will share a format on which trainees should the report.
- Each box should be filled with accurate information.
- The trainer will check the mock reports generated by each trainee.
- The best performers will be recognized by the class.

Chart Paper

- In this activity, the Trainer will divide the class into 3 groups.
- Each group will be given 3 different topics on which they have to provide a broad explanation.
- Group A will require writing on Reporting method of Inaccurate Data/Information and whom to report.
- Group B will require writing on Anomalies That May Occur In Data/Information.
- Group C will require writing on Different Techniques Used To Obtain Data/Information.
- It is important that the Trainees present their answers not only rich in information but also supported by hand-drawn diagrams.
- The group which can present their answers in the best way within 30 minutes will be awarded appreciation and accolades.

Group Discussion

- This activity is in the form of “Group Discussion”
- The trainer will divide trainees into 5 groups
- All the groups will sit together to discuss the goals of a project, estimate the timeframe required and plan the deployment
- Every trainee should actively participate in the discussion
- Each group will carry a notebook and pen to chalk out details
- They will jot down the points, important dates and processes
- After the discussion, each group will produce a Minutes of Meeting
- The trainer will supervise the entire process and ensure each and every one participates in the meeting

Exercise



A. Fill in the Blanks

1. It is important to provide the executive with specific _____ procedure.
 - a). Deadline
 - b). Implementation
 - c). Comment
2. The full form of OSI is _____.
 - a). Open Source Initiative
 - b). Outsourcing Solutions Inc.
 - c). Open Switching Interval
3. One of the templates used for information or data is _____.
 - a). Software Architecture Design
 - b). Relative Theory
 - c). Hardware design
4. _____ method is dependent on group discussions with in-depth topic exploration.
 - a). Discussion
 - b). Focus group
 - c). Coding Theory

Notes 





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7. Maintain an Inclusive, Environmentally Sustainable Workplace

Unit 13.1 - Sustainable Practices

Unit 13.2 - Respect Diversity and Strengthen Practices to Promote Equality



SSC/N9014

Key Learning Outcomes



By the end of this module, participants will be able to:

1. Illustrate sustainable practices at workplace for energy efficiency and waste management.
2. Apply different approaches to maintain gender equality and increase inclusiveness for PwD.

UNIT 7.1: Sustainable Practices

Unit Objectives



By the end of this unit, participants will be able to:

1. Demonstrate how to optimize usage of electricity/energy, materials, and water in various tasks.
2. Explain the process of implementation of energy efficient systems in a phased manner.
3. Identify and segregate recyclable, non-recyclable and hazardous waste generated for disposal or efficient waste management.

7.1.1 Optimize Usage of Electricity/Energy, Materials, and Water

Greenery within and around the office premises and other corporate environments helps not only to enhance the décor of the workplace, but also has a positive impact on the productivity of the employees. Greenery helps people to concentrate on work, creates positive vibes among the workers and the visitors.

Apart from the introduction of greenery, conservation of energy and optimization of usage are equally important. There are certain essential tools and equipment that are used in every workplace, which require electricity. For example, air conditioner, light, fan, computer, coffee vending machine are such electrical gadgets or appliances which are extensively used in the offices. Similarly, steady water supply in the washroom is another important requirement. Optimized usage of all these essential energy or commodities is absolutely significant to conserve energy and create an eco-friendly work environment.

What does greenery do?

- Plants in workplaces purify the air; they reduce the concentration of CO₂ (Carbon dioxide gas) and other volatile organic compounds, keeping the air fresh and healthy.
- External vegetation moderates heat in and around office block in the summertime, pulling down heat stress and decreasing the necessity for air-conditioning.
- Green roofs and facades proliferate insulation or the absorption capacity of heat, plummeting heating and cooling expenses.
- Plants in and around office buildings release water vapour which moistens the air, dipping headaches.
- ‘Green views’ also boost focus, and aid quicker recovery from stress.
- Green environments encourage people to undertake activities such as a lunchtime walk, keeping staff alert and healthy. Long periods of sitting adversely affect health.

Plan the implementation of energy efficient systems

Here are some simple energy management ideas one can implement in the work station.

- Do not use artificial lighting in offices when natural light is sufficient
- Open draperies and raise shades whenever adequate light from windows is available
- Use energy-saving fluorescent lights and lamps
- Switch off lights and appliances in unoccupied office spaces or unused rooms such as conference room.
- Switch on the lights and ACs/ fans during the conference
- Turn off the bathroom's fan and lights whenever they are not occupied
- Install the light sensors to remind and educate office users about wasted light
- Use rechargeable batteries for calculators and other office devices
- Turn off computers that are not used, and utilize computers' energy/power management tools (i.e. sleep mode, hibernate mode, screen saver)
- Reduce the use of lighting during night cleaning
- Keep office doors and windows closed if heating and air conditioning is on
- Switch off HVAC systems in offices when they are not in use
- Ensure thermostats are correctly adjusted
- Purchase and use high-efficiency office equipment and devices
- Set up a self-adult system for the office energy consumption

Initiatives towards efficient use of natural resources and energy, reduction and prevention of pollution

These are some measurements that help optimize the usage of energy in the workplace. However, another important aspect of optimizing the usage of energy and other materials is proper maintenance. Organizations should prepare a checklist to measure and maintain energy and material conservation. Following is a sample checklist for the energy and material conservation module at workplaces.

Category	Checklist Items
Energy management	<p>Establishment of energy management organization, and employee education</p> <p>Energy conservation targets and investment budget setting</p> <p>Grasp status of implementation of energy conservation</p> <p>Measurements and recording of monthly usage (electricity, gas, oil, and water)</p> <p>Preparation of statistics, including graphs showing differences from previous month or year</p> <p>Grasp of energy intensity (MJ/m²/year)</p> <p>Establishment of management standards</p>
Heat source and heat-conveying equipment	<p>Temperature control for chilled water, cooling water, and hot water</p> <p>Adjustment of the flow rate and pressure of pumps and fans</p> <p>Steam leakage and insulation management</p> <p>Management of air ratio and exhaust gas of combustion equipment</p> <p>Control of steam pressure and blow-down</p> <p>Cooling water quality control (electrical conductivity)</p> <p>Control of opening of valves and dampers (e.g. automatic valves)</p>
Air-conditioning and ventilation equipment	<p>Proper temperature setting</p> <p>Turning off air-conditioning for rooms not in use or unoccupied</p> <p>Adjustment of appropriate outside air intake volume</p> <p>Review of operating hours</p> <p>Effective operation of total heat exchanger (e.g. Rosunai)</p> <p>Local cooling and local exhaust</p> <p>Indoor air quality control (e.g. CO₂)</p> <p>Installation of (manual or automatic) inverter device to ventilation fans</p> <p>Suspending either of the operation of a 4-pipe air conditioning system, if used</p> <p>Control of ventilation in car parking space (CO concentration control)</p>

Water supply/drainage and sanitation equipment	Control of supplied water flow and pressure
	Water saving measures (e.g. water-saving tap and automatic flashing)
	Change temperature and pressure setting on the heat source equipment depending on the season
	Operation with intervals in hot water supply circulation pump
	Utilization of rain water and well water
	Management of kitchen equipment (e.g. cooking and washing machines)
Management of electric power receiving and transforming facilities	Optimization of demand
	Usage control
	Voltage adjustments
	Power factor management
Operation management of lighting equipment	Optimum illumination control
	Switching off lights when they are not necessary (use of daylight)
	Cleaning of lighting fixtures and change to more energy-saving fixtures
	Replace incandescent lamps to fluorescent lamps
	Adoption of energy-saving FFE (furniture, fixture, and equipment)
Operation & management of elevating machines	Operation
	Adoption of inverter control
	Adoption of human motion sensors to escalator
Buildings	Blocking of solar radiation on the windows (e.g. shading curtains and light-shielding films)
	Blocking of solar radiation on the roof (heat reflection coating)
Others	Maintain the place around the condensing units for air-conditioning and chillers
	Utilization of heat from hot spring
	Installation of boilers using waste materials as fuel
	Utilization of solar heat
	Wind, solar, and small hydro power generation
	Use late-night electricity
	Co-generation

Table 7.1.1 Energy and Material Conservation Checklist

Various energy options including renewable and non-renewable

Renewable Energy is an endless energy source that does not deplete upon use and produces no or minimum waste. Such energy sources are renewed spontaneously on a human timescale. The International Energy Agency (IEA), an independent authority on Environment and Sustainable Development based in Paris, explains: " "Renewable Energy is produced from perpetually replenishing natural processes. It derives in its different forms straight from the Sun or from heat generated deep inside the earth. Electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, biofuels, and hydrogen obtained from renewable resources are included in the definition."

- **Wind Power:** Wind power is a source of solar power. Wind energy (or wind power) refers to the utilisation of wind to create electricity. Wind turbines transform wind's kinetic energy into mechanical energy. A generator converts mechanical energy to electrical energy.
- **Geothermal Energy:** Although the Sun warms the Earth's surface, it is not responsible for the planet's interior temperature.
- **Solar Energy:** Solar energy is the conversion of solar energy into thermal or electrical energy. Solar energy is the most abundant and cleanest renewable energy source currently accessible.

Bioenergy is renewable energy derived from biological and natural sources. Even landfills and garbage zones are bioenergy resources due to technological advancements. It can be utilised as a renewable energy source, supplying heat, gas, and fuel.

- **Hydropower Energy:** Hydropower, often known as hydro-energy, is a type of renewable energy that utilises water held in dams and flowing in rivers to generate electricity in hydropower plants. The blades rotate a generator that turns the mechanical energy of the spinning turbine into electrical energy.

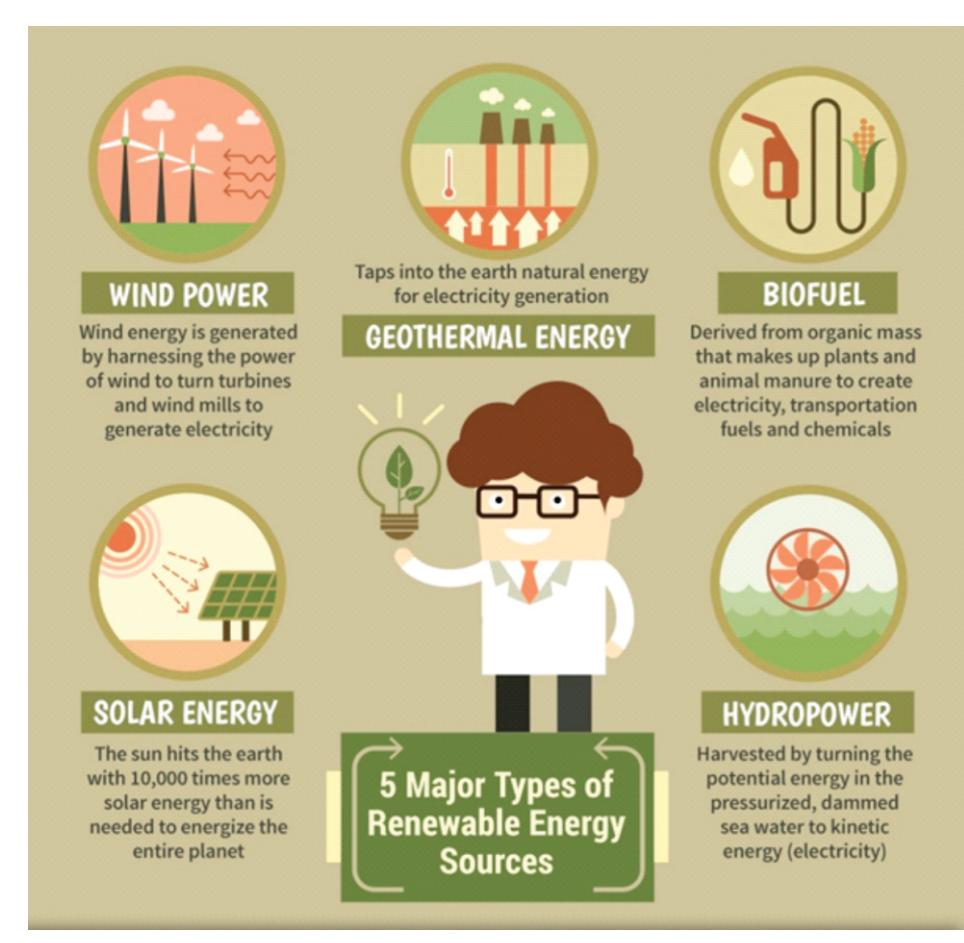


Fig 7.1.1 Renewable Energy Sources

Renewables generate no greenhouse emissions during energy production, making them the cleanest and most viable way to combat environmental damage. Unlike conventional energy sources such as coal, gas, oil, and nuclear, whose supplies are finite, clean energies are derived from and adapt to natural cycles. This makes them a crucial component of a sustainable energy system that allows for the development of the present without endangering future generations.

Electricity First Aid Emergency Procedures

The first aid kit should have the following essential items for giving first assistance:

- Cuts, scratches, punctures, grazes and splinters
- Muscular sprains and strains
- Minor burns
- Amputations and/or major bleeding wounds
- Broken bones
- Eye injuries
- Shock

To ensure that workers have a thorough understanding of first aid in the workplace, one must establish and implement first aid protocols. The procedure must include:

- The type of first aid kits and their locations.
- The placement of first aid amenities include first aid rooms
- Who is accountable for the first aid supplies and facilities, and how often should they be inspected and maintained?
- How to create and maintain adequate communication systems (including equipment and procedures) to ensure timely communication with first aiders in the event of an emergency.
- The essential communication equipment and methods when first aid is required (especially for remote and isolated workers). These procedures should include information on where the communication equipment is located, who is accountable for it, and how it should be maintained.
- The work locations and shifts assigned to each first aid responder. These procedures should include the names and contact information for every first responder.
- Arrangements to guarantee that first aiders receive adequate instruction.
- Arrangements to ensure that employees obtain proper first aid information, instruction, and training
- Requesting information about any first aid needs that may require specific treatment in a medical emergency, such as severe allergies, when an employee begins work. Information about a worker's health must be kept confidential and shared with first aid personnel only with the worker's permission.
- Instructions on how to report work-related injuries and illnesses.
- Methods to prevent exposure to blood and bodily fluids.
- What to do if a worker or other individual is too injured or ill to remain at work, such as if they need assistance with transportation to a medical facility, home, or a place where they may rest and recover.
- Access to debriefing or counselling services to assist first responders and employees following a significant workplace incident.

Here the steps to free a person from electrocution

Switch off the main power.



Don't touch the person who is electrocuted.



Try to remove the person from the electrical source with the help of non-conducting objects like stick, cardboard, bamboo, etc.



Lay the person in this position.



Table 7.1.2 Steps to save a person from electrocution

7.1.2 Segregate Recyclable, Non-Recyclable and Hazardous Waste

Hazard is defined as a factor, which may cause harm to people and properties alike, like electricity, inflammable products, explosive material, corrosive chemical, using heavy ladders at workplace etc. Simply put, a Hazard is simply a condition or a set of circumstances that present a potential for harm. Risk is defined as the likeliness or the chance that a hazard can actually cause harm to somebody. For example, smokers of cigarettes run the risk of developing Cancer. The potential or imminent danger that Risks and Hazards expose the concerned premises to, is known as Threat. For example, a person, who has the potential of blowing up a building, is a threat to that building and its inhabitants.

The steps involved in Risk Management are:



Fig 7.1.2 Risk Management Matrix

The most common waste materials procured in a workplace can be categorized in the following:

Liquid Waste

- Sludge, dirty water, organic liquids, waste water after washing.

Solid Waste

- Industrial slag, plastics waste, wood waste, paper waste, metals, and glass.

Organic Waste

- Biodegradable food waste, animal waste, vegetable waste, garden waste, rotten meat of animals can be deposited at Landfills or converted into Manure and Biogas.

Recyclable Waste

- Paper, metals, wood, organic waste etc. can be recycled.
- Must be placed in appropriate Recycling Bin and treated according to the nature of the waste.
- For example, organic waste can be converted into manure and Biogas.

Hazardous Waste

- Such waste may be flammable, corrosive, radioactive, toxic etc.
- These can potentially harm the environment and must be placed in clearly and legibly labelled bins for appropriate treatment and disposal.



Fig 7.1.3 Waste Segregation and Disposal Bins

Hazards and potential risks / threats can be identified and then reported to supervisors or other authorized persons in the following ways:

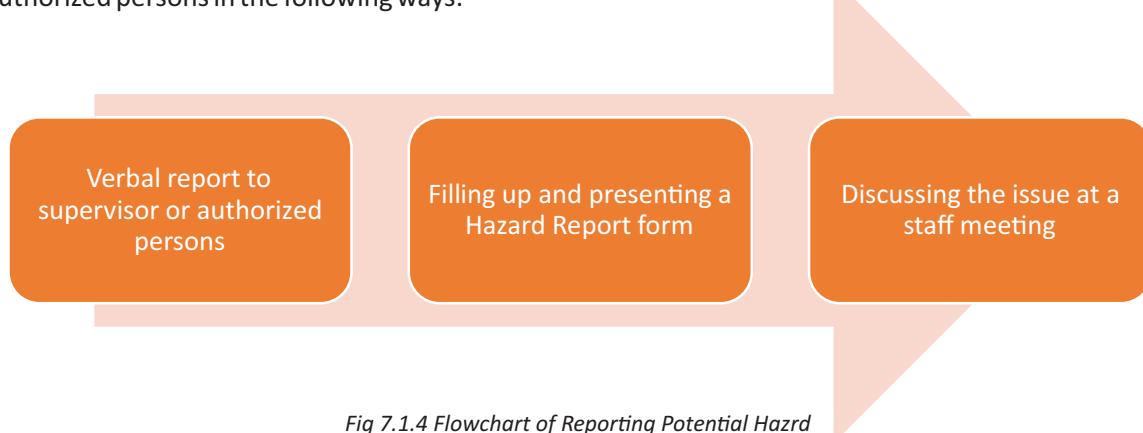


Fig 7.1.4 Flowchart of Reporting Potential Hazrd

Identification of hazard implies the job is half done. In order to take adequate precautionary measures against hazards, one needs to identify the hazards commonly found in the workplace. The common methods of hazard identification are:

Job Hazard Analysis (JHA)

- This is a popular technique to identify the perils associated with specific tasks in a job role, in order to lessen the risk of injuries to employees.
- The steps involved in successfully conducting JHA are:

A. Divide the entire job role into small tasks or steps

Let us understand the concept with the help of an example, where JHA is being conducted on corporate work such as Technical Support Engineer.

Steps	Hazards Associated	Recommendations
1. Handling tools and equipment of the trade		
2. Working with common electrical appliances of the workspace		
3. Stress factor of the job role		

Table 7.1.3 JHA Checklist for Hazard Identification

A. Spot out the hazards associated with each step by asking questions like:

- What can go wrong with this task?
- What would be the consequences if the task went wrong?
- How could the task go wrong?
- What are the other contributing factors?
- What are the chances that this hazard will take place?

B. Review and discuss the scope of the hazards with the employees, who would actually do the tasks on hand

C. Find out strategies and ways to mitigate or avoid the hazards

E. Review and revise the JHA periodically

Hazard and Operability (HAZOP) Study

- This technique involves a structured and systematic examination of an existing method / procedure, thus, in turn, identifying and assessing the associated hazards.
- These hazards can be easily identified in the form of Deviations in the process parameters (physical conditions and elements like flow, pressure, temperature, humidity, etc).
- The severity of Deviation can be illustrated with the help of specific and predetermined Guide Words.
- A Deviation is a manner in which the process conditions stray away from the expected values.

The steps involved in conducting HAZOP are:

- Segregating the entire system or process into sections or components
- Select a study node or point
- Define the expected outcome or consequence

- Choose a process parameter, based on the expected consequence
- Implement a suitable Guide Word
- Determine the Cause behind the deviation
- Start with the cause that may lead to the worst possible consequence
- Assess the deviations thus detected
- Devise and prescribe action
- Record and document information
- Repeat the process from B

Guide Word + Process Condition / Parameter = Deviation.

For example, No + Signal = No Signal

Common examples of Guide Words and their meanings are:

Guide Word	Meaning	Example
No (Not, None)	None of the desired consequence is achieved	No flow of gas through the gas cutting nozzle due to accumulated dirt
More (Higher than, More of)	Quantitative increase in a certain process parameter	More heat generated and higher temperature achieved than expected, during sawing operations
Less (Lesser than, Less of)	Quantitative reduction in a certain process parameter	Lower pressure than expected
As well as (In addition to)	All the design intentions are achieved and an additional activity takes place	All valves closed at the same time
Reverse	The logical opposite of the design intention takes place	The Power Drill continues drilling even after shutting down the power supply
Other Than	An unexpected activity takes place	Presence of liquid fuel in Gas Cylinder

Table 7.1.4 Guide Words and their Interpretation

The 3 Rs of Waste Optimization

- **Resource Optimization:** Raw materials must be used to the fullest, so that minimal waste is procured while converting the raw materials into finished products.
- **Recycling of Scrap Material:** Scraps, when created, must immediately be incorporated in the manufacturing process, so that they get reused completely as raw material.
- **Enhanced Quality Control:** This can be implemented by minimizing the number of rejects per batch. This is easily achievable with a higher frequency of careful inspection, accompanied with constant monitoring.
- **Exchange of Waste:** Some wastes cannot be completely eliminated from the manufacturing process. Such waste can be effectively managed via Waste Exchange techniques, where the waste procured in a certain process becomes the raw material of another, and vice versa.

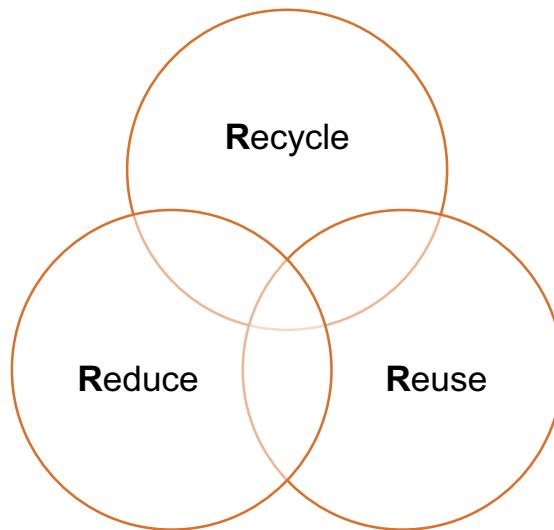


Fig 7.1.5 Rs of Waste Optimization

Landfill

- Waste, that cannot be recycled, is deposited and a layer of soil is added on top of it

Incineration

- Involves controlled combustion of waste
- 90% volume of waste gets reduced and converted into incombustible, light-weight materials like ash, gases and heat
- Gases are released into the environment while the heat is utilized in power generation

Biogas Generation

- Organic waste are biodegradable and can be converted into Biogas in Biogas Plants, with the help of certain fungi and bacteria
- The residue, after generation of Biogas, is used as Manure

Manure Generation and Composting

- Organic waste are often left buried under soil beds
- They decompose into rich manure, full of nutrients and minerals

Vermicomposting

- Involves the degradation of organic waste into manure, with the help of worms
- The worms feed on the organic waste and convert them into manure

Notes



UNIT 7.2: Respect Diversity and Strengthen Practices to Promote Equality

Unit Objectives



By the end of this unit, participants will be able to:

1. Explain the diversity policy of the organization.
2. Comply to PWD inclusive policies for an adaptable and equitable work environment.

7.2.1 Concept of Gender, Gender Equality and Gender Discrimination

Policies and procedures about gender inclusivity, equality and sustainability while working with colleagues

The Constitution of India applies uniformly to equality of opportunity for all citizens (including every legal citizen of India, whether they are the disabled) in matters relating to employment or healthy or disabled. Under the Constitution the appointment to any office under the State. As a matter of fact, the employees of an organization constitute of major diversity. They come from different region, with different cultural and religious beliefs. However, the employer should provide equal opportunity to each and every employee, irrespective of gender, culture, religion. Particularly, the Indian Government has taken several measurements to ensure gender equality in the workplace. To establish women's right in the workplace, the government has passed bills. The Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act, 2013 is an Indian law that aims to protect women against sexual harassment in the workplace. On September 3, 2012, it was approved by the Lok Sabha (the lower chamber of the Indian Parliament). The Rajya Sabha (the upper house of the Indian Parliament) approved it on 26 February 2013.

The major features of the policy include:

- The Act defines sexual harassment in the workplace and establishes a complaint resolution process. It also gives protections against fraudulent or misleading charges.
- The Act also includes 'quid pro quo harassment' and 'hostile work environment' as kinds of sexual harassment when they occur in conjunction with an act or behaviour of sexual harassment.
- The Act's expansive definition of "aggrieved woman" encompasses all women, regardless of their age or job level, whether in the organised or unorganised sectors, public or private, and also includes clients, consumers, and domestic workers.

- Section 2 defines an employer as any person responsible for the management, supervision, and control of the workplace, including those who establish and administer the organization's policies (g).
- While the "workplace" in the Vishaka Guidelines is limited to the traditional office setting where there is a clear employer-employee relationship, the Act includes organisations, departments, offices, branch units, etc. in the public and private sectors, organised and unorganised, hospitals, nursing homes, educational institutions, sports institutes, stadiums, sports complexes, and any place visited by the employee in the course of employment. This regulation will apply to non-traditional workplaces that entail telecommuting as well.
- The Committee is required to conclude its investigation within ninety days. The report will be given to the employer or the District Officer, depending on the circumstances, and they are required to take action within sixty days.
- Employers must establish an Internal Complaints Committee in each office or branch with 10 or more employees. The District Officer must form a Local Complaints Committee in each district, and at the block level if necessary.
- The Complaints Committees have the same authority to acquire evidence as civil courts.
- The Complaints Committees are supposed to provide conciliation prior to commencing an investigation if the complainant so requests.
- The investigation procedure under the Act must be kept confidential, and anyone who violates confidentiality is subject to a Rs 5,000 fine.
- Among other requirements, the Act compels employers to conduct education and sensitization initiatives and adopt policies against sexual harassment. The objective of Awareness Building can be attained via Banners and Posters displayed in the building, eLearning courses for employees, managers, and internal committee members, classroom training sessions, and email, eLearning, or classroom training for communicating the organization's sexual harassment policy. It is advised that eLearning or Classroom Training be provided in the employee's primary language of communication.
- Employers are now subject to penalties. Noncompliance with the Act's requirements is penalised by a fine of up to Rs. 50,000/-. Repeated infractions may result in harsher penalties and the revocation of a company licence or deregistration.
- The government can order an official to check the workplace and sexual harassment-related records of any organisation.
- To investigate any complaints made under the Act, which also applies to students in schools and colleges and hospital patients, employers and local governments would be compelled to set up grievance panels. Employers who refuse to comply can be fined up to 50,000 Indian Rupees.

7.2.2 Organization's Redressal Mechanisms

Inclusive tools and practices of communication to acknowledge/validate, share and promote the cause of gender parity at workplace

Women's safety and its related topics are addressed and debated globally. The number of sexual harassment reports continues to rise at an alarming rate each year. Therefore, in order to protect the safety of its female employees, a particular business must provide for their needs.

So, a company must inform women about the various facilities that they are going to provide them. Some of the basic facilities include the following.

1. Transportation facilities:

Transportation plays a huge role in ensuring women safety. Ensuring that the women will be accompanied by trusted drivers will help enhance women's safety. Be transparent about the security that you may provide during night trips. Every woman must be aware of the various safeguards that the company may provide.

2. Reporting Abuse:

The management must be prompt in its decision making whenever there is a mishap. The ways of reporting abuse must be made clear to the woman to ensure speedy remedy.

3. Maternity-related grievance:

Employers are required to notify women entering the workforce in writing and electronically about the maternity benefits provided under the Maternity Benefit Act.

The law permits women to work from home during their maternity leave if the nature of their work permits it.

4. CCTV Cameras

Ensure that every station is equipped with CCTV cameras which are nowadays the most vital component for investigating sexual harassment cases.

5. Security Guards

Ensure that adequate amount of security guards are stationed at strategic places so that any threat to women's safety can be nullified. Ensure that the women are informed about the various places where the security guards are present.

6. Women's Helpline:

Share a leaflet containing the Women's helpline number/s and other important contacts.

7. Chain locks/latches

Provide women with chain locks and latches so that their luggage can be properly and securely kept and to avoid any form of theft.

8. Smoke Detector:

Inform the women about the location of smoke detectors inside the premises.

Providing these basic amenities will ensure that the women enjoy comfortable accommodation without any fear.

All forms of gender discrimination, violence and inequality

The Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act, 2013 establishes a system for investigating and redressing accusations of sexual harassment against women in the workplace. It also gives protections against fraudulent or misleading charges.

The principal clauses of the Act impose the following obligations on employers in order to ensure a safe workplace for women:

- Display penal consequences of sexual harassment
- Organize workshops and sensitization programs
- Formulate an internal policy, charter, resolution, declaration
- Form an 'Internal Complaints Committee' (ICC) where the number of employees is more than ten
- Provide necessary facilities to the committees
- Secure attendance of witnesses/respondent
- Monitor timely submission of committee reports
- Assist the woman in pursuing a criminal case if she so chooses
- Maintain confidentiality of the inquiry process. The Act lays down a penalty of Rs 5,000 (US\$68) on the person who has breached confidentiality
- With sexual harassment being a crime, employers are obligated to report offenses

To tackle the problem of sexual harassment at workplace, the Ministry of Corporate Affairs, through a notification dated July 31, 2018, amended the Companies (Accounts) Rules 2014. The notification makes it mandatory for private companies to disclose their compliance with the Act in their directors' annual report.

Furthermore, the Act places responsibility on the appropriate state government to notify the district officer for setting up a Local Complaints Committee (LCC).

HR managers are on the front lines when it comes to changing cultural attitudes about sexual harassment.

Below are some best practices that HRs can develop to ensure safe work environment for women:

- Update the official employee handbook that outlines the procedure that will take place when sexual harassment is being experienced at work. Include an unequivocal statement that sexual harassment will not be tolerated.
- Give out a clear, simple, and easy-to-understand description of what constitutes harassing behaviour or conduct, including examples of the types of behaviours that are considered harassing at the workplace.

- Implement training for all to include more focus on gender identity and sexual orientation, and emphasize gender neutrality regarding who may experience sexual harassment.
- Sensitize male employees and reinforce confidence among women to come forward and file complaints.
- Stay updated on employment law changes where their employees live or work. HRs must also utilize professional associations, legal counsel and online resources to ensure that the company is compliant and aware of existing and upcoming legislative changes related to employee rights.

Use Internal & External Communication to Colleagues

It is often said that one's behaviour is the mirror to one's character. Indeed, your behaviour speaks a lot about the kind of person you are. Your educational degrees hold little importance if you are not a well-mannered person. You need to conduct well in almost every situation whether you appear for a job interview or pursue post-graduate degree, at your workplace or while dealing with your clients, in your school/college or while attending parties. Even at your home in front of your relatives, it is your good behaviour which counts the most. But behavioural etiquette is something which cannot be forced on anyone, it has to be cultivated and nurtured within oneself.

Showing compliant behavioural etiquette towards women is very important.

What are the various instances where one can show such etiquette? Let's take a look:

- **Before entering the room:** You must always knock and ask for permission before entering. This is perhaps the most basic etiquette. You must ensure that the privacy of the woman is unharmed. So, knock and take verbal permission before entering a room.
- **Avoiding touch contact:** You must always ensure that you do not intrude on the customer's personal space. This is not only unprofessional but also unhygienic. So try your best to avoid touch contact. If absolutely necessary, ask for permission and then assist the customer.
- **Using Abusive languages or gestures:** This is the last thing a women/customer expects from you. Ensure that you never use any foul language in front of the customer. Ensure that you don't abuse your colleagues in front of the guests.

Women are empowered by society and the law; some essential rights that are universally applicable to both sexes, but specifically for women, are as follows:

- Rights as a woman to dignity and respect, which entails that no man of any age is permitted to make sexual approaches, tease, or harass a woman.
- No one has the right to make women feel uncomfortable in the workplace, at home, on the streets, at school, college, or at a social gathering.

- Rights to physical and mental security: No one has the right to use physical force, to torture women physically or psychologically, or to coerce women in any way, regardless of their relationship to the perpetrator.
- Complaint privilege: Women have the right to lodge a complaint when even the slightest of their rights are abused. Take counsel and follow the correct course of action in such situations, regardless of the individual's status as a superior, relative, or neighbourhood bully.
- Security rights as a woman employee according to Visakha rules for preventing sexual harassment in the workplace.
- Physical or emotional violence against women is not a woman's inevitable fate, as is sometimes asserted. Dominant behaviour is neither a person's right nor a woman's destiny; therefore, it is perfectly acceptable to complain about it.

A security procedure is a predetermined sequence of operations that accomplishes a certain security task or function. Typically, procedures are structured as a sequence of steps to be followed as a consistent and recurring strategy or cycle to achieve a desired outcome.

Once adopted, security procedures give a specified set of steps for performing the organization's security affairs, hence facilitating training, process auditing, and process improvement. Procedures give a starting point for adopting the consistency required to reduce variation in security procedures, hence enhancing organization-wide security control.

An employer must ensure that the employees feel safe at all times without being over threatened by the security procedures and related environment.

7.2.3 Comply to PWD Inclusive Policies

How to maintain and provide a conducive work environment that is free from any harassment; facilities and amenities to PWD

The Indian Government respects the equality and therefore no discrimination should be made on the ground of disability. The Constitution guarantees all people, including those with disabilities, the right to justice, freedom of thought, speech, belief, faith, and worship, equality of status and opportunity, and the development of brotherhood. No disabled person may be required to pay taxes for the promotion and maintenance of a specific religion or religious group. To enforce the same, the government has passed laws to protect disabled and their right to equality. The laws pertaining to disabled are as follows:

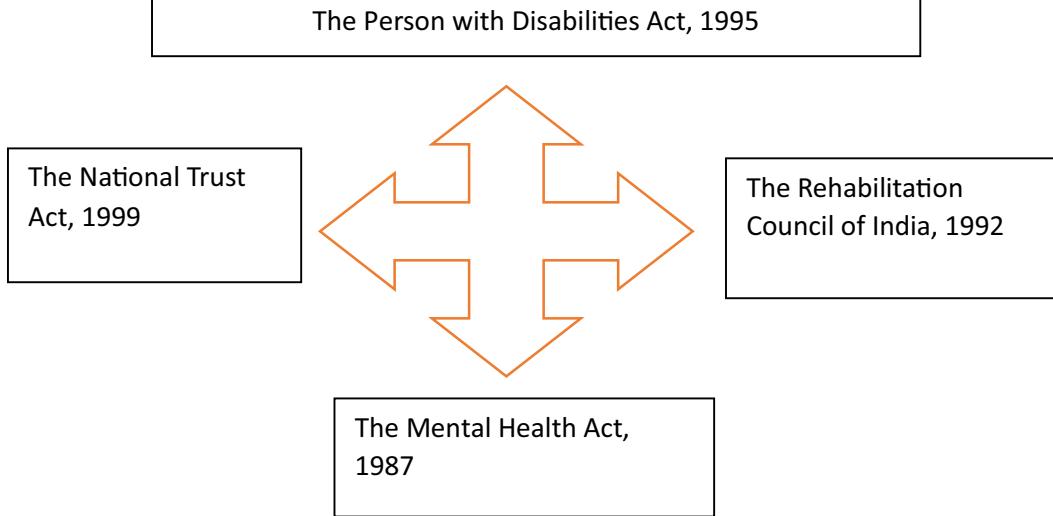


Fig 7.2.1 Acts Related to Disabilities

Improve through specifically designed recruitment practices, PWD friendly infrastructure, job roles, etc.

The 2016 Act expands the term of 'disabled person' to include persons with disability, persons with benchmark disability, and persons with disability and high support requirements. This inclusive concept classifies 21 categories of disabilities as "specific disabilities."

The Act is applicable to both government and private establishments. According to the law, a private establishment is a corporation, firm, cooperative or other society, associations, trust, agency, institution, organisation, union, or other government-designated establishment.

The Act mandates that all organisations develop and publish an Equal Opportunity Policy. All types of discrimination against those with disabilities are forbidden, unless it can be demonstrated that such discrimination is proportionate and essential for accomplishing legitimate ends.

The Act provides additional benefits for people with certain disabilities, including work openings in government agencies, educational opportunities, land distribution, and poverty alleviation programmes, among others.

To provide swift justice, special courts are established in each district to hear matters involving the infringement of the rights of disabled individuals. The maximum penalties for violating the rights of disabled people is \$7,750 (Rs 500,000) and the maximum term of jail is five years.

Use and advocate for appropriate verbal/nonverbal communication, schemes and benefits of PWD

Although the majority of Act compliances apply only to government facilities, private establishments are also subject to the Act and must adhere to the following requirements:

- Frame and publish an Equal Opportunity Policy on the organization's website or in a prominent location inside the organization's premises. The Policy shall outline the accommodations and benefits made available to disabled employees. In addition, a copy of the Policy must be filed with the State Commissioner.
- Establishments with more than 20 employees must appoint a Liaison Officer to monitor the recruitment of handicapped individuals and the provision of specific facilities for them.
- Establishments must identify job openings that would be suitable for disabled candidates. In establishments receiving government incentives, a minimum of five percent of open positions must be reserved for disabled individuals.
- The employer must ban unlawful discrimination against disabled individuals in the workplace.
- The business must provide additional facilities or special advantages to disabled employees, such as special leave and training programmes, to boost their accessibility.
- All establishments must adhere to the government-issued accessibility standards for disabled individuals. The accessibility standards apply to infrastructure and communication technology in the workplace that must be accessible to impaired individuals.
- Every covered employer is required to maintain a record of its disabled personnel.

Summary

- Greenery within and around the office premises and other corporate environments helps not only to enhance the décor of the workplace, but also has a positive impact on the productivity of the employees
- Plants in workplaces purify the air; they reduce the concentration of CO₂ (Carbon dioxide gas) and other volatile organic compounds, keeping the air fresh and healthy
- External vegetation moderates heat in and around office block in the summertime, pulling down heat stress and decreasing the necessity for air-conditioning
- Green roofs and facades proliferate insulation or the absorption capacity of heat, plummeting heating and cooling expenses
- Plants in and around office buildings release water vapour which moistens the air, dipping headaches
- Hazard is defined as a factor, which may cause harm to people and properties alike, like electricity, inflammable products, explosive material, corrosive chemical, using heavy ladders at workplace etc.

- In order to take adequate precautionary measures against hazards, one needs to identify the hazards commonly found in the workplace
- The Constitution of India applies uniformly to equality of opportunity for all citizens (including every legal citizen of India, whether they are the disabled) in matters relating to employment or healthy or disabled.
- The Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act, 2013 establishes a system for investigating and redressing accusations of sexual harassment against women in the workplace.
- The 2016 Act expands the term of 'disabled person' to include persons with disability, persons with benchmark disability, and persons with disability and high support requirements.

Activity



Activity 1

Energy Conservation - Prepare a sample checklist and monitor

- This activity is in the form of “Prepare a sample checklist and monitor energy usage”
- This activity targets to make the trainees understand the optimization of energy in the workplace
- The trainer will divide the class into three groups
- The trainer will distinguish one particular room for the case study
- Each group will be assigned with the following tasks
 - Count the number of lights, fans and ACs in the case study room
 - Note down the duration of their usage
 - Assess the proper usage and wastage
 - Prepare a checklist to evaluate how to optimize the energy usage
 - Submit a document furnishing observations
- The trainer will check the documents and declare the best group

Activity 2

Waste management

- This activity is in the form of “Waste management”.
- The trainer will ask every trainee to prepare a sample hazard measurement checklist (as shown in Unit 7.1.2).
- The trainees should assess the waste management system of the building.
- They should prepare a document on the existing waste management system and propose systems to enhance it.
- They must be able to segregate between different types of waste and their treatment.
- On the merit of the document submitted by the trainees, the trainer will announce the best reports
- The trainees who furnished best reports will be appreciated by the class.

Exercise



A. Match the Followings:

Column A	Column B
The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act	1995
The Person with Disabilities Act	1992
The Mental Health Act	1999
The Rehabilitation Council of India	2013
The National Trust Act	1987

B. Choose the Correct Answer from the Responses Given:

1. Which of the following options is incorrect?
 - a). Greenery absorbs heat and keep the office building cool
 - b). Greenery is mandatory as per the law enforced by government
 - c). Greenery enhances productivity
2. IEA stands for -
 - a). Indian Energy Agency
 - b). Indian Energy Authority
 - c). International Energy Agency
3. Employers who fail to comply will be punished with a fine of up to -
 - a). INR 50,000
 - b). INR 5,00,000
 - c). Yet to determined

C. Answer the Following Questions

1. What are the basic steps of risk management?
2. Write down the key features of organization's redressal mechanism regarding women safety.
3. What are the common sources of renewable energy?
4. What could be the possible outcomes of violating PWD policies?
5. Write down the steps of saving a person from electrocution.

Notes



Annexure of QR Codes for Junior Software Developer

Chapter No.	Unit No.	Topic	Page No.	QR Code Links	QR Code (s)	Video Duration
Chapter 1: Assist in Performing Software Construction and Software Testing Entry- level Tasks in the It Services Industry	Unit 2.1- Basic of IT	Basics of IT	36	https://www.youtube.com/watch?v=hRikWL3FUDw	 Basics of IT	00:02:33
	Unit 2.6 - Tools and Software for testing Entry Level Tasks	Software Testing - IT Services Industry	85	https://www.youtube.com/watch?v=2Teo7K8NXJc	 Software Testing - IT Services Industry	00:02:33
Chapter 3: Manage Your Work to Meet Requirements	Unit 3.2 - Work Ethics to Follow in an Organization	Work Ethics to follow in an organization	104	https://www.youtube.com/watch?v=bkRvBNQzOmo	 Work Ethics to follow in an organization	00:01:50
Chapter 4: Work Effectively with Colleagues	Unit 4.2 - Significance of Healthy Team Bonding in Ideal Work Culture	Significance of Healthy Team Bonding in Ideal Work Culture	118	https://www.youtube.com/watch?v=nYpMBBnB354	 Significance of Healthy Team Bonding in Ideal Work Culture	00:02:35
Chapter 5: Maintain a Healthy, Safe and Secure Working Environment	Unit 5.2 - Evacuation Procedures for Workers and Visitors	Evacuation Procedures for Workers and visitors	131	https://www.youtube.com/watch?v=x_IAR8GXf_k	 Evacuation Procedures for Workers and visitors	00:02:02
	Unit 5.4 - Health, Safety, and Accident Reporting Procedures and the Importance of These	Method of Health, Safety, and Accident Reporting	145	https://www.youtube.com/watch?v=bsafBtbJmrk	 Method of Health, Safety, and Accident Reporting	00:02:02

Chapter No.	Unit No.	Topic	Page No.	QR Code Links	QR Code (s)	Video Duration
Chapter 6: Workplace Data Management	Unit 6.2 - Follow the Accurate Process Flow to Analyse Data	Rule Based Analysis	162	https://www.youtube.com/watch?v=9CYabKjCx3U	 Rule Based Analysis	00:02:15

Notes







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