Teaching and Learning Material

eCommerce

National Vocational Certificate
Level-4 in Marketing and Advertising
(E-Commerce)

NATIONAL VOCATIONAL & TECHNICAL TRAINING COMMISSION
NAVTTC نیوٹک

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Level-4 in Marketing and Advertising
(E-Commerce)

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Foreword

The National Vocational & Technical Training Commission (NAVTTC) developed a National Skills Strategy (NSS) after extensive research and consultation with experts and stakeholders including policy makers and representatives from Industry, Academia and the Provincial Government departments dealing with technical and vocational training. The strategy aims at establishing a regime that facilitates competency-based and demand-driven training and assessment.

NAVTTC has developed competency-based training programs with the technical support of TVET Reform Support Programme (TVET-RSP), which is funded by the European Union, the Kingdom of the Netherlands, the Federal Republic of Germany and the Royal Norwegian Embassy. The Programme has been commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and is being implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in close collaboration with NAVTTC. These vocational training programs have been approved by the National Curriculum Review Committee (having representation from all over the country from TEVTAs and industry) for implementation in Public and Private Training institutions.

The purpose of developing competency-based training programs is to equip the learners with modern skills and knowledge for each of the trades to meet the requirements of local as well as international markets. These training programs include competency standards, qualification, curriculum, assessment material and teaching & learning material that will aid in implementation of competency-based and demand driven training in the country.

This Teaching and Learning Material is part of the competency based training program exclusively developed to support the implementation of CBT curricula. This Material is intended for the use of learners undertaking training in *National Vocational Certificate Level-4 in Marketing and Advertising (E-Commerce)* under the guidance of experts and appropriate trainers. This Teaching and Learning Material has been designed in consultation with industry, academia and researchers to ensure that the material is relevant and current.

On behalf of the Federal Government/NAVTTC, I wish to express my sincere appreciation and gratitude to all subject matter experts, industry representatives and TVET-RSP experts who have diligently contributed in producing this valuable Teaching and Learning Material.

Executive Director
National Vocational & Technical Training Commission
(NAVTTC)

Introduction

E-commerce or Electronic Commerce is an area of business or occupation in which buying and selling of goods and services, or the transmitting of funds or data, through internet are carried out. E-commerce has gained substantial importance in recent years and have opened opportune for learners to become entrepreneur by getting knowledge and skills required.

The National Vocational & Technical Training Commission (NAVTTC) has developed a national qualification entitled, "National Vocational Certificate Level-4 in Marketing and Advertising (E-Commerce)". Relevant industry and employers were consulted in the design and validation processes in order to come up with a national qualification that fulfills the requirements of the sector in general and the occupation in particular.

This Teaching and Learning Material (TLM) is developed based on competency standards and curriculum of the E-Commerce national qualification. It carries a learning volume of 80 credits and includes five learning modules which are as under:

Module 1: Business Analysis
Module 2: Web Design / Development
Module 3: Quality Assurance
Module 4: E-Marketing
Module 5: Legal and Ethical Aspects

This TLM provides support for more effective training and productive learning. Each of the learning modules contains learning outcomes and information regarding learning elements in the form of knowledge, skills and attitudes. At the end of every learning module are Frequently Asked Questions (FAQs) and Test Yourself which will help learners in self-assessment before proceeding to modular or final assessment.

Table of Contents

Module 1: Business Analysis

Learning Outcomes

After completion of this learning module, you will be able to:

- Understand the basic concepts of E-Commerce
- Use market intelligence to identify market demands
- Analyze and document requirements
- Create software design
- Develop test cases for requirements

Learning Unit 1: Concept and Terminologies

Overview

E-Commerce is a concept applicable to any type of business or commercial transaction that involves the transfer of information via the Internet. After completing of this learning unit, you will able to understand growth and development of E-commerce, E-tailing or virtual storefronts, Electronic Data Interchange (EDI),Electronic Funds Transfer (EFT), Categories of E-commerce Types of E-commerce sites and E-commerce related issues like currency conversion, copy rights etc.

Remember

E-commerce is all about trust customers pay you for a product without being able to size up your store, employees or even your product.

1. Evolution of E-Commerce

A timeline for the development of e-commerce is as under:

1979: Michael Aldrich invented online shopping.

1984: EDI, or electronic data interchange, was standardized through ASC X12. This guaranteed that companies would be able to complete transactions with one another reliably.

1992: Compuserve offers online retail products to its customers. This gives people the first chance to buy things off their computer.

1994: Netscape arrived. Providing users a simple browser to surf the Internet and a safe online transaction technology called Secure Sockets Layer.

E-Commerce

It is the buying and selling of goods and services, or transmitting of funds or data over an electronic network primarily the internet.

1995: Two of the biggest names in e-commerce are launched: Amazon.com and eBay.com.

1998: DSL, or Digital Subscriber Line, provides fast, always-on Internet service to subscribers across California. This prompts people to spend more time, and money, online.

1999: Retail spending over the Internet reaches $20 billion, according to Business.com.

2000: The U.S government extended the moratorium on Internet taxes until at least 2005.

2005: First Internet Retail Conference and Exhibition. The final release of VirtueMart.

2006: Google debuts google checkout.

2010: Magento mobile is released allowing store owners to create native mobile storefront apps. E-commerce gets serious about social media and more personal conversations taking place between business and consumer.

Do you know!

Magento E-Commerce solution was launched by Varien in 2002.

2013: US E-commerce and Online Retail holiday sales reach $46.5 billion, up 10 percent.

2014: Overstock.com processes over $1 million in Bitcoin sales. US E-Commerce and Online Retail sales projected to reach $294 billion, an increase of 12 percent over 2013 and 9% of all retail sales.

2. Inception of E-tailing and EDI

E-tailing

Short for "electronic retailing. E-tailing is the selling of retail goods on the Internet. E-tailing began to work for some major corporations and smaller entrepreneurs as early as 1997 when Dell Computer reported multimillion dollar orders taken at its Web site. The success of Amazon.com hastened the arrival of Barnes and Noble's e-tail site. Concerns about secure order-taking receded. 1997 was also the year in which Auto-by-Tel reported that they had sold their millionth car over the Web, and Commerce Net/Nielsen Media reported that 10 million people had made purchases on the Web.

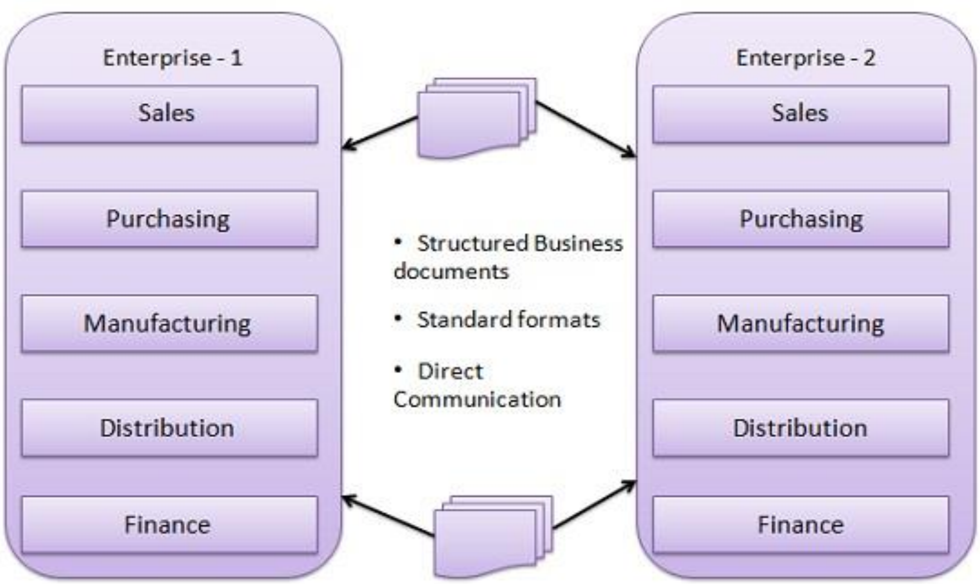
As a place for direct retail shopping, with its 24-hour availability, a global reach, the ability to interact and provide custom information and ordering, and multimedia prospects, the Web is rapidly becoming a multibillion dollar source of revenue for the world's businesses.

Virtual Store Front

The virtual store is an online store that displays merchandise and an order form. A live text chat may be offered, in which the customer interacts in real time with a company representative.

Electronic Data Interchange (EDI)

EDI stands for Electronic Data Exchange. EDI is an electronic way of transferring business documents in an organization internally between its various departments or externally with suppliers, customers or any subsidiaries etc. In EDI, paper documents are replaced with electronic documents like word documents, spreadsheets etc.



Process of Electronic Data Interchange

EDI Documents

Following are few important documents used in EDI:

1. Invoices
2. Purchase orders
3. Shipping Requests
4. Acknowledgement
5. Business Correspondence letters
6. Financial information letters

Steps in an EDI System

Following are the steps in an EDI System:

1. A program generates the file which contains the processed document.
2. The document is converted into an agreed standard format.
3. The file containing the document is send electronically on network.
4. The trading partner receives the file.
5. An acknowledgement document is generated and sent to the originating organization.

3. Electronic Funds Transfer (EFT)

Electronic funds transfer (EFT) is the electronic transfer of money from one bank account to another, either within a single financial institution or across multiple institutions, through computer-based systems and without the direct intervention of bank staff.

EFTs include direct-debit transactions, wire transfers, direct deposits, ATM withdrawals and online bill pay services. For example, when you use your debit card to make a purchase at a store or online, the transaction is processed using an EFT system. The transaction is very similar to an ATM withdrawal, with near-instantaneous payment to the merchant and deduction from your checking account.

4. Categories of E-Commerce

Ecommerce can be broken into following four main categories.

Business-to-Consumer (B2C)

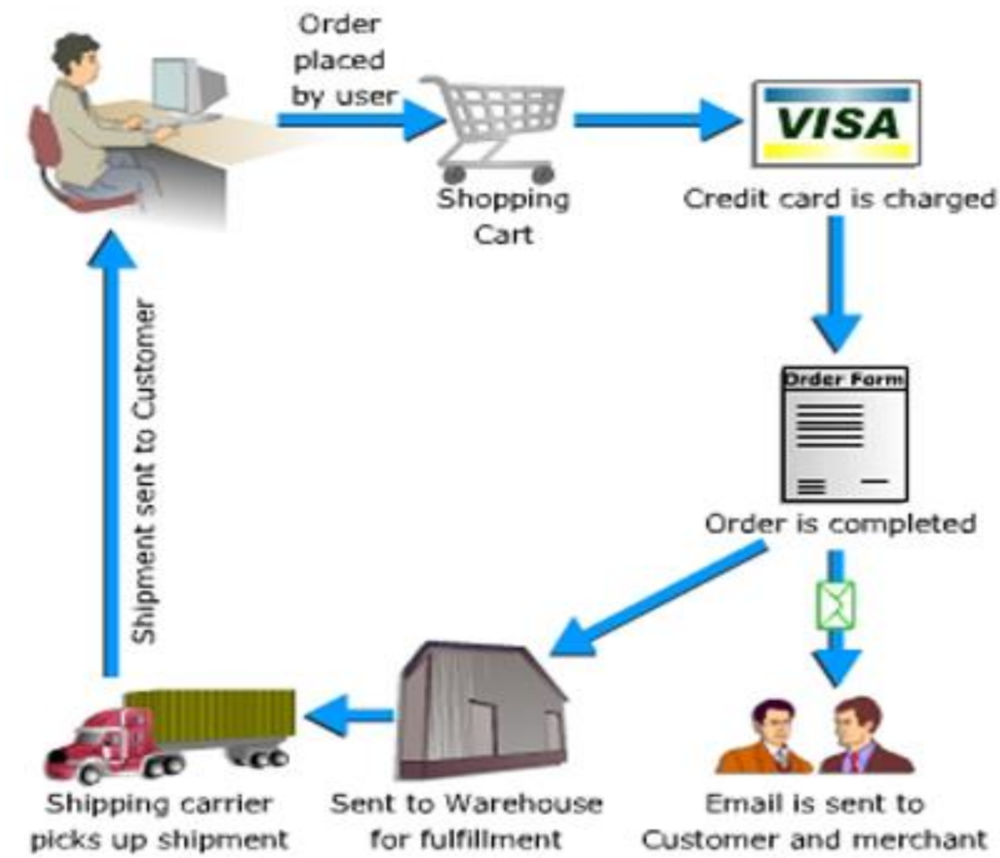
In a B2C, companies sell their online goods to consumers who are the end users of their products or services. Usually, B2C E-commerce web shops have an open access for any visitor, meaning that there is no need for a person to login in order to make any product related enquiry.

Do you know!

Thomson Holidays submitted first ever B2B electronic transaction using online technology in 1981.

Remember

Elance was one of the first web sites to offer C2B type of transactions. It allows sellers to advertise their skills and prospective buyers to advertise projects.



B2B AND B2C E-COMMERCE

Business-to-Business (B2B)

In a B2B, companies sell their online goods to other companies without being engaged in sales to consumers. In most B2B E-commerce environments entering the web shop will require a log in. B2B web shop usually contains customer-specific pricing, customer-specific assortments and customer-specific discounts.

Consumer-to-Business (C2B)

In a C2B, consumers usually post their products or services online on which companies can post their bids. A consumer reviews the bids and selects the company that meets his price expectations.

Consumer-to-Consumer (C2C)

In a C2C, consumers sell their online goods to other consumers. A well-known example is eBay.

Government-to-Consumer (G2C)

The electronic commerce activities performed between the government and its citizens or consumers, including paying taxes, registering vehicles, and providing information and services.

5. Types of E-Commerce Sites

Following are different types of E-commerce sites:

- Educational site
- Auction sites
- News sites
- Entertainment sites
- Financial sites

Auction Sites

They host auctions of the products on behalf of the sellers. The seller sells the product or service to the person who bids the highest price. For sellers, online auctions open up new sales channels for new products and offer buyers favorable purchasing conditions.

6. Ecommerce Issues

Currency Conversion

One of the major issues companies face when going global is how to deal with multiple currencies. Simply doing all transactions in rupees is the easiest solution for a Pakistani merchant, but it's also the one with the most potential to turn off new customers you're trying to attract. E-commerce companies are figuring out how to better serve their new customers by offering sales in their home currencies.

When it comes to setting themselves up to sell in global markets, they basically need three things:

1. A multicurrency merchant account through a company that can process payments from providers in the countries where you'll operate.

2. A payment processing gateway set up to handle credit cards from international providers.

3. An online shopping cart that supports multiple currencies.

Do you know!

Offering sales in home currencies is complicated to set up but likely to pay off in the long-term, since buyers who are more comfortable dealing with a familiar currency are apt to return more often and spend more at the site.

Copy Rights

The most exciting form of e-commerce is the sale of bits sold in packets representing works protected by copyright: e-books, e-journals, music, films, photographs etc. The owner of the copyright protected material can control who copies the work, how much will be charged for copies, and whether or not to allow the public to use or make derivative works of the original. A copyright violation could cost thousands of dollars in legal fees, time, forced subscription fees, and potential fines.

Product Delivery

For product delivery you can decide to outsource all of your shipping requirements including insurance, packaging and scheduling. You can decide to take care of some shipping aspects in-house, you'll need to outsource the actual transportation of the goods. Offer your customers a well-known, reliable shipping company. Using a name-brand shipping company gives customers confidence in your ability to deliver their merchandise on time and undamaged — even if your business is relatively unknown.

Product EULA (End User License Agreement)

It is the contract between the licensor and purchaser, establishing the purchaser's right to use the product. The license may define ways under which the product can be used, in addition to the automatic rights of the buyer including the freedom to use, archive and re-sale etc.

Taxation

E-commerce presents a major challenge for tax administrations, given the often multi-jurisdictional nature of the transactions and the potential anonymity of the parties. For e-commerce conducted by Pakistani resident companies with Pakistani individuals or businesses, the tax treatment is largely the same as physical business.

Linguistics

Linguistics play an important role for your ecommerce sites. When you are planning your SEO strategy and PPC ad campaigns for users visiting your website, it is vital to ensure that they find an environment they can relate to and which “speaks the same language” as them. This goal cannot be achieved if you rely on machine translations and do not involve native speakers in the creation of your content. Think about finding a website that sells something you really like, but their product pages, including the descriptions, are poorly worded with grammatical errors – this would leave you suspicious and more likely to leave the site for an alternative provider.

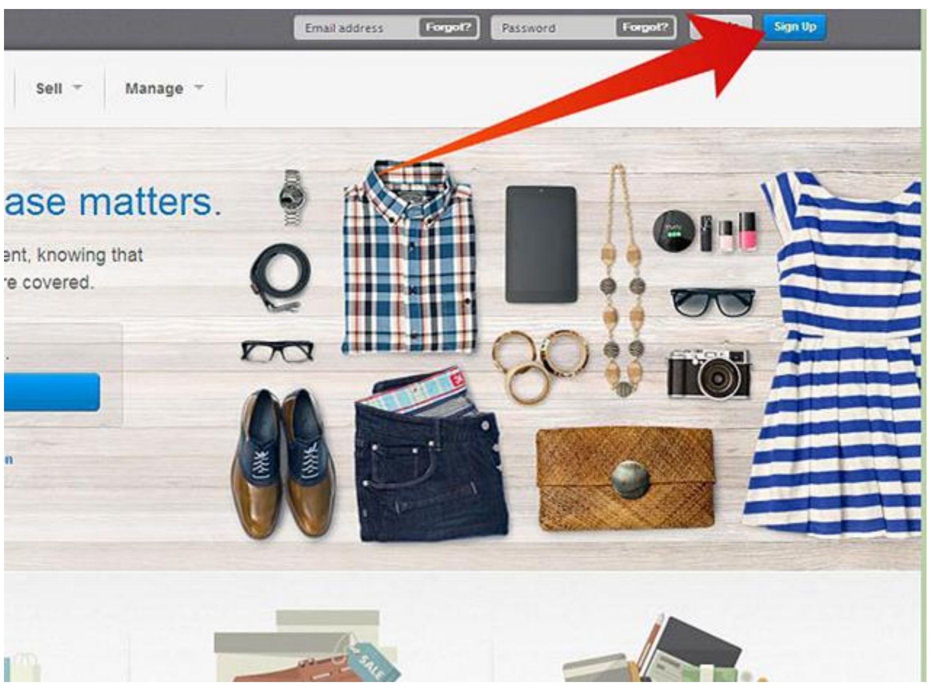
Creating and using PayPal Account (an E-commerce Web Application)

The procedure of creating and using a PayPal account has the following steps:

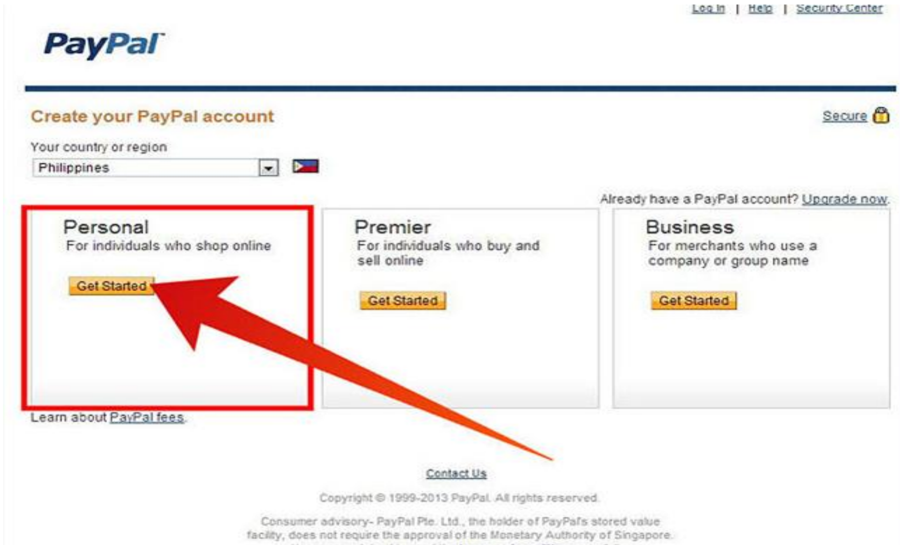
1. Open www.PayPal.com and click Sign up.

PayPal

PayPal is one of the most popular and trusted ways to send and receive money online.



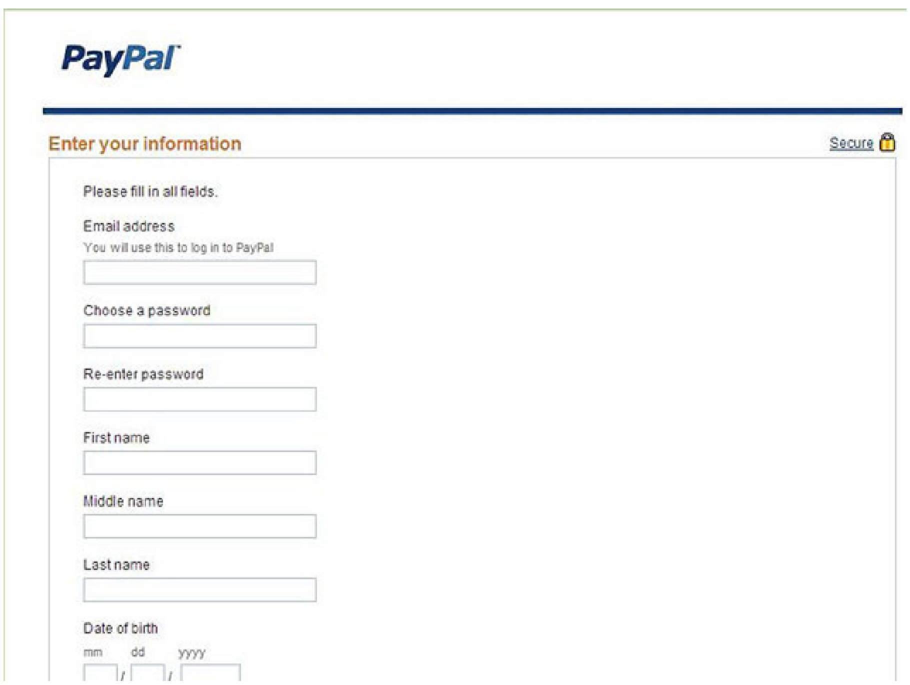
2. On the first page, fill in your country information and then choose whether you are registering a personal account or an account for a business or nonprofit organization.



Remember

You can still upgrade your personal account to one of the other types later, so don't apply as a business just to get a Business-level account.

3. On Next Page fill in the required information and then carefully read over the policies hyperlinked near the end of the page.



Do you know!

There are different account levels. The most basic account is the Personal account. It's free, and comes with a $500 monthly withdrawal limit.

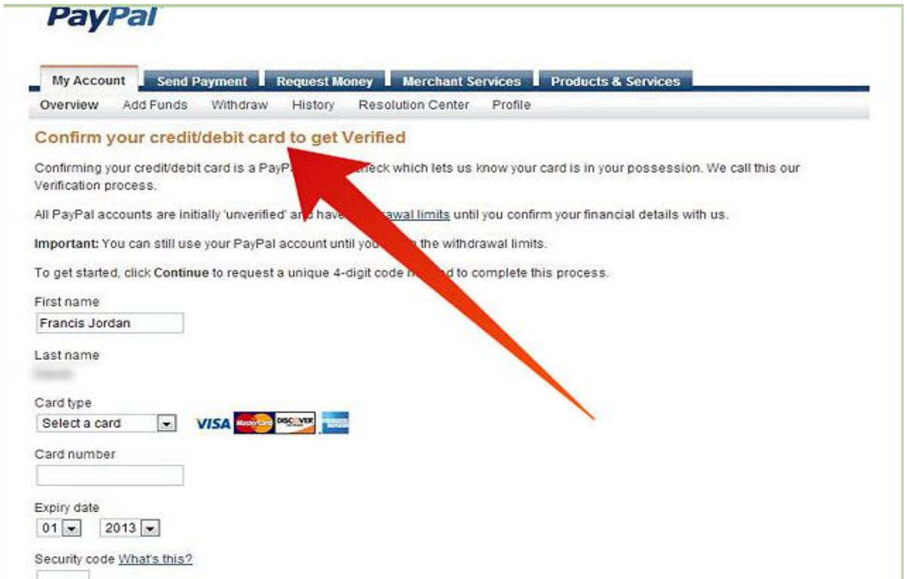
4. After reading policies, check the box to indicate you've read it and click the yellow button at the bottom of the page that reads "Agree and Sign Up."

5. Once your account has been created, you can log in using the information you provided. Click "Upgrade." Follow this link if you would like to purchase a Premium or Business account.

Remember

Some of PayPal's services are restricted until you have verified your account, so do it as soon as possible.

6. Verify your account by a link on the main page that will allow you to do this. Your account can be verified by linking it to another bank account, proving you are a real person.



Do you know!

Transferring fund from your bank is free, but each transfer takes 3-5 days on average.

7. To add money Click “Add Money”. Choose how you would like to add money. You can transfer funds from your bank. By providing bank information to PayPal, Complete the transaction. Follow the prompts on the next screen after you choose your deposit method to complete it.

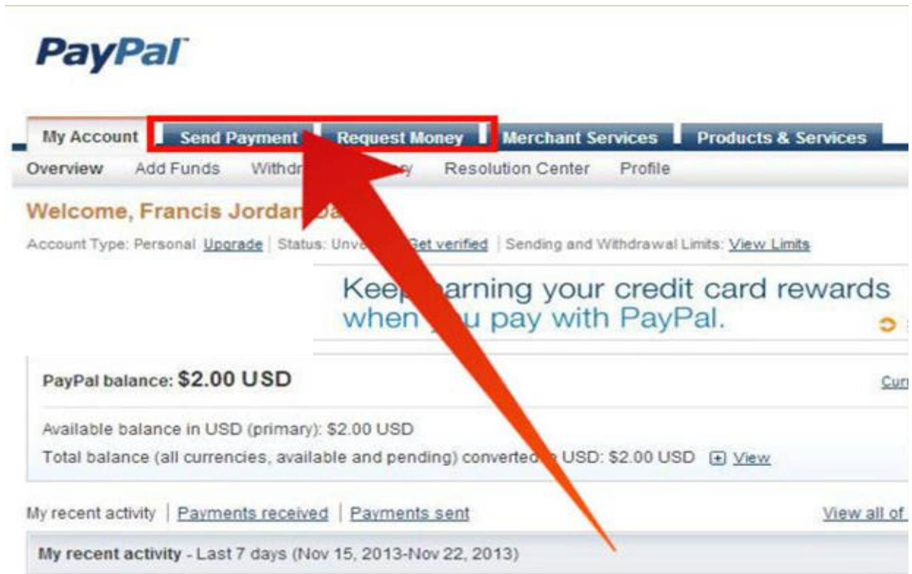
8. To withdraw money click the link on the main page that says “Withdraw” to begin. Choose your withdrawal type. PayPal has a number of withdrawal options that vary in delivery medium and convenience. Choose the one you prefer and click on the appropriate link. The options are:

   - A bank account transfer.
   - A written check from PayPal.
   - A PayPal debit transaction.
   - An ATM cash withdrawal.
   - A “Special Offers” option.

   Complete the transaction. Fill in any additional required information on the next page and submit your request.

9. To send money, choose whether you are sending money as a Western Union-style wire transfer to a friend or family member, or sending money to pay for goods or services. Once you have chosen the appropriate option, read over the fees and complete the transaction.

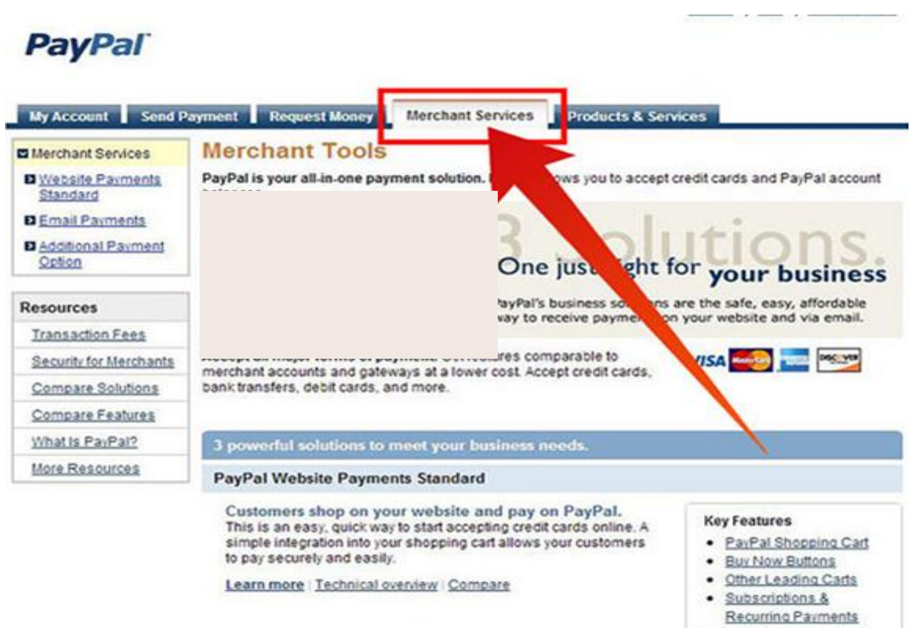
   To request money, choose whether to send an invoice or a simple request. Read over the fees involved with receiving money from a request, and finish up.



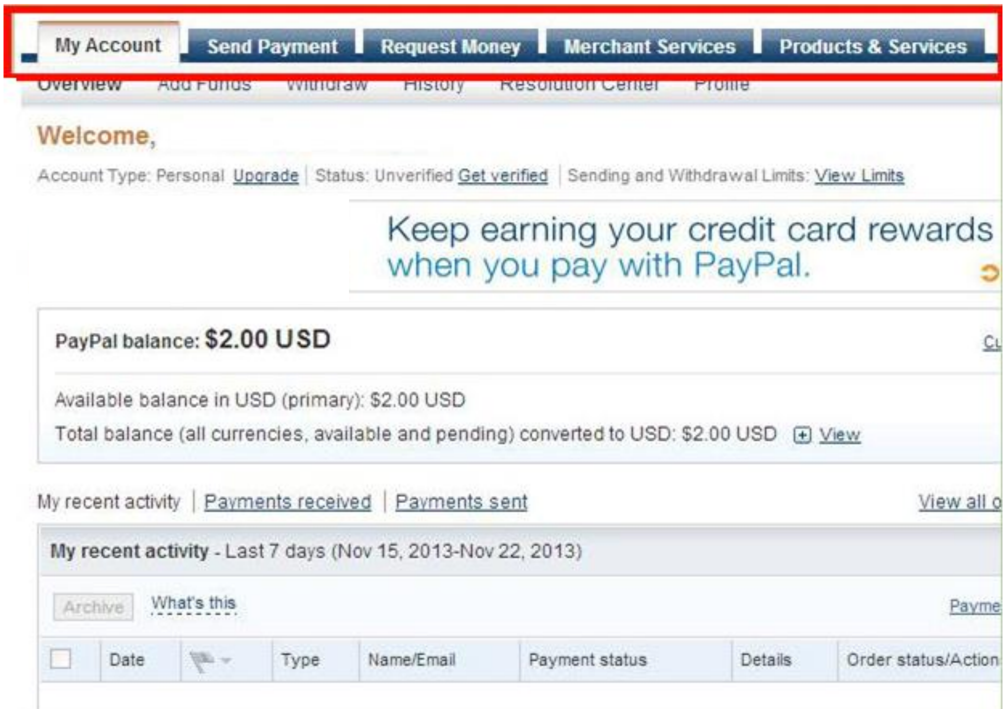
10. PayPal offers a fairly broad range of other services, especially business (selling) services, that range from custom website buttons to smartphone credit card swiping devices for physical storefronts.

Remember

Each tab contains a sub-page with more specific options. By switching tabs and exploring options, you can find every piece of information on the site with ease.



There are five tabs across the top bar of the PayPal site. The tabs are: My Account, Send Money, Request Money, Merchant Services, Products & Services.



Go to the My Account tab for these options: Overview, Add Money, Withdraw, History, Statements, Resolution Center and Profile for you to review and edit.

Learner's Activity

Creating and using eBay account.

Description: This activity consists of an interactive session in the class about using eBay (an E-commerce Web Application).

Time Guideline: 30 min

Purpose: To be able to create and use eBay account.

Presentation: Divide the class into groups of two.
Brief the groups about the activity that each group will create eBay account and one group will demonstrate the procedure of buying on eBay and the other will demonstrate the procedure of selling on eBay.
Groups will practice these tasks.
One member from each group will present to the class methods of buying and selling on eBay.

Learning Unit 2: Market Intelligence

Overview

Market intelligence is a concept that is related to a continuous process that allows data and information transformation to knowledge to be applied for market oriented decisions. After completion of this learning unit, you will be able to understand trend analysis, apply competitive intelligence and decision making techniques like what if scenario.

Remember

Trend analysis requires time series data, i.e. data that are comparable over time.

1. Market Intelligence

Market intelligence is the information relevant to a company's markets, gathered and analyzed specifically for the purpose of accurate and confident decision-making in determining strategy in areas such as market opportunity, market penetration strategy, and market development.

2. Trend Analysis

Trend Analysis is the practice of collecting information and attempting to spot a pattern, or trend, in the information to identify product opportunities. Following figure shows process of trend analysis.

Step 1: Compiling a List of Trends

↓

Step 2 : Imagining Future Scenarios

↓

Step 3 : Identifying Unmet Needs

↓

Step 4 : Defining Opportunity

Illustration of Trend Analysis

Do you know!

In Trend analysis we use demographic, cultural and technology trends.

1. Compiling a List of Trends

Trends can be divided into three broad categories: Demographic, Cultural and Technological. List of trends are compiled in this step. Trends can be found from Direct observation, Sitepal, Google Trends, trend watching web site, New words, Trend Hunter.

2. Imagining Future Scenarios

You must think about the consequences if a trend or a combination of trends continue to spread. How will these trends change what people buy or desire to buy and what will happen if the trends intensify.

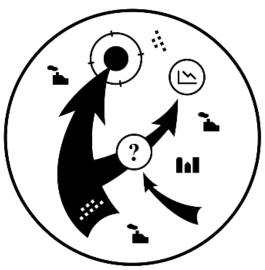
3. Identifying Unmet Needs

Once the effects of the rapidly spreading trends are identified then the unmet needs can be identified.

4. Defining a Product Opportunity

The product or services currently available and the envisioned product or service are described. Currently available products or services are described by the core benefit to the customer, how the product or service works and the approximate cost. The imagined product or service is described by the core benefit to the customer.

3. Competitive Intelligence



Competitive intelligence (CI)

It is the action of defining, gathering, analyzing, and distributing intelligence about products, customers, competitors, and any aspect of the environment needed to support executives and managers making strategic decisions for an organization.

Process of competitive intelligence

The process of competitive intelligence is outlined in the following steps:

1. Setting intelligence objectives (i.e. designing the requirements)
2. Collecting and organizing data about the industry and competitors
3. Analyzing and interpreting the data
4. Disseminating the intelligence

Remember

CI can be applied to understand and learn what's happening in the world outside your business so one can be as competitive as possible.

Example

Example is the Japanese automobile industry's analysis of the U.S.-automobile market in the 1970s. High gasoline prices and smaller families created a demand in the United States for smaller, more fuel-efficient cars. Japanese automakers employed competitive intelligence methods to determine this trend and then made manufacturing decisions based on it, beating the U.S. Big Three to market with high quality, fuel-efficient cars.

4. Decision Making for Market Segmentation

Decision Making tools

1. What-If Analysis

In What-If Analysis, a specific type of Scenario Analysis, you ask a series of "what if" questions to predict potential complications and the impact they'll have on company operations. Making Decisions by Exploring Scenarios.

As a risk management tool for decision-making, "What If" Analysis helps you brainstorm risks and then explore solutions.

Do you know!

Apple's iPhone and Samsung's Galaxy Android phones come in different models with different storage, different features and different price.

2. Cost Benefit Analysis

A process by which business decisions are analyzed. The benefits of a given situation or business-related action are summed and then the costs associated with taking that action are subtracted.

Market segmentation

Market segmentation is the process of dividing your target market into clearly defined subgroups of consumers who have common wants, needs and priorities. When you identify these segments, you can tailor your marketing strategies to meet these wants, needs and priorities in a cost-effective way.

Learner's Activity

Segmenting a Market

Description: This activity consists of an interactive session in the class about how to segment a market. The activity would work best in small groups and reporting back to the overall class.

Convenience driven consumers	Budget conscious shoppers	Focus on quality	Rational, value for money	Attracted to strong brands
Environmentally aware	Family focused	Health and diet conscious	Service/relationship focus	Flexibility is important
Social status	Variety seekers	Benefit seekers	Just for me	Existing customers

Time Guideline: 30 min

Purpose: Learners would be able to understand concept of market segmentation

Presentation:

1- Each group will choose two products/markets. One would be a physical good and one would be a service industry.
2- Using the above list of market segment ideas, each group will construct a market segment for each of these markets.
3- Groups will compare how similar/different is their segmentation approach between the two markets.
4- Then groups will share their market segmentation approach with the rest of the class and the common segments utilized.
5- They will tell in their opinion, which market segmentation structure (in the class) would be the most effective.

Learning Unit 3: Requirement Analysis

Overview

Requirements analysis is critical to the success of any project. After completion of this learning unit, you will be able to create functional requirements, understand the purpose of requirement traceability matrix and create Software Requirement Specification document.

1. Functional Requirements

Functional requirements specify the business requirements of the project in detail. Usually business requirements are specified in terms of the actions that user performs on the software system. This is known as the use case model. But not all requirements need to be specified as use cases. Functional requirements should contain a combination of use cases and plain textual description of system features. System features are specified at a higher level and use cases attempt to translate into user actions.

Again there is no fixed format for use case description, but it usually contains the following information,

Use case diagram – For a small systems, a single diagram can be used to depict all the use cases in the system.

List of actors and their details – This identifies the various types of users interacting with the software system.

Use case description – Purpose of the use case and how and when it is invoked by the user. This should also include an identifier for easy reference.

Preconditions – List of system states/conditions that must be true for the successful execution of the use case. This section is optional and could be easily incorporated into the basic steps section.

Basic steps – These indicates the various fine grained steps required for the execution of the use case.

Alternate steps – These indicate alternate events of the use case being described.

Business validations/rules – These indicates various types of input validations or business rules required in the use case being described.

Post conditions – Indicates the results of the use case. Please note that this section is optional and could be incorporated into the basic steps section.

To ensure that all the business requirements are addressed in the final software product, a traceability matrix document is used.

2. Requirement Traceability Matrix

Traceability matrix tracks each requirement through various phases of software development (detailed design, unit test plans, system testing plans, user acceptance test plans and code components). This requires that every requirement in the SRS should be identifiable by a unique number or tag.

For software projects where majority of features are available as user interfaces, it is better to complement this section with screen prototypes. These user interfaces can change during detailed design, but having a draft version of user interface in the requirements document helps a lot in communicating business requirements. However some customers insist on having finalized user interfaces in the requirements specification document.

3. Creating Software Requirement Specification (SRS) Document

The procedure of documenting requirements has the following steps:

1.

SRS

It is a description of a software system to be developed, laying out functional and non-functional requirements, and may include a set of use cases that describe interactions the users will have with the software.

Create an SRS outline .Use a template (available on web) to create an outline for you SRS doc. Modify it to suit your organization's needs. SRS outlines vary, depending on the organization and their processes. Here is an example of a simple SRS outline:

1. Purpose
2. Scope
3. System Overview
4. References
5. Definitions
6. Use Cases
7. Functional requirements
8. Non-functional requirements

, the SRS is ready to be written. Here are some tips to writing an SRS:

2. The writer should have superior communication skills. Technical writers can be involved because they know how to gather and process the right information; they also know how to convey customer requirements

3. Make things visual as a picture can save 1000 words. Include graphics such as tables and charts to communicate your ideas better.

4. Don't over-document. Avoid including things that may not need to be documented. SRS documents may get a bit long, so avoid packing in unnecessary information.

5. Keep an online version of the SRS and keep updating. As your tasks progress and if your staff and process changes, the SRS will need to be updated. For this reason, keeping a virtual version will help keep the whole team on the same page every time a change is made.

Learning Unit 4: Requirement Designing

Overview

On completion of this learning unit, you will be able to design requirements using Data Flow Diagrams, Entity Relationship Diagram, Object Modeling Technique and Unified Modeling Language.

Remember

There is a prominent difference between DFD and Flowchart. The flowchart depicts flow of control in program modules.

1. Techniques of Designing

Data Flow Diagram (DFD)

Data flow diagram is graphical representation of flow of data in an information system. Data Flow Diagrams are either Logical or Physical.

Do you know!

Data flow diagrams can be used in both Analysis and Design phases.

DFD Components

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

Entities - Entities are source and destination of information data.

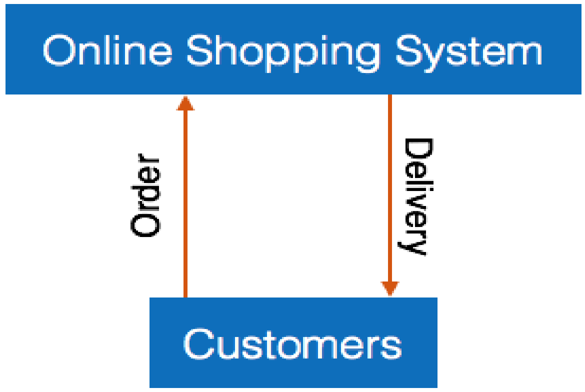
Process - Activities and action taken on the data.

Data Storage –shows storage of data.

Data Flow - Movement of data is shown by pointed arrows.

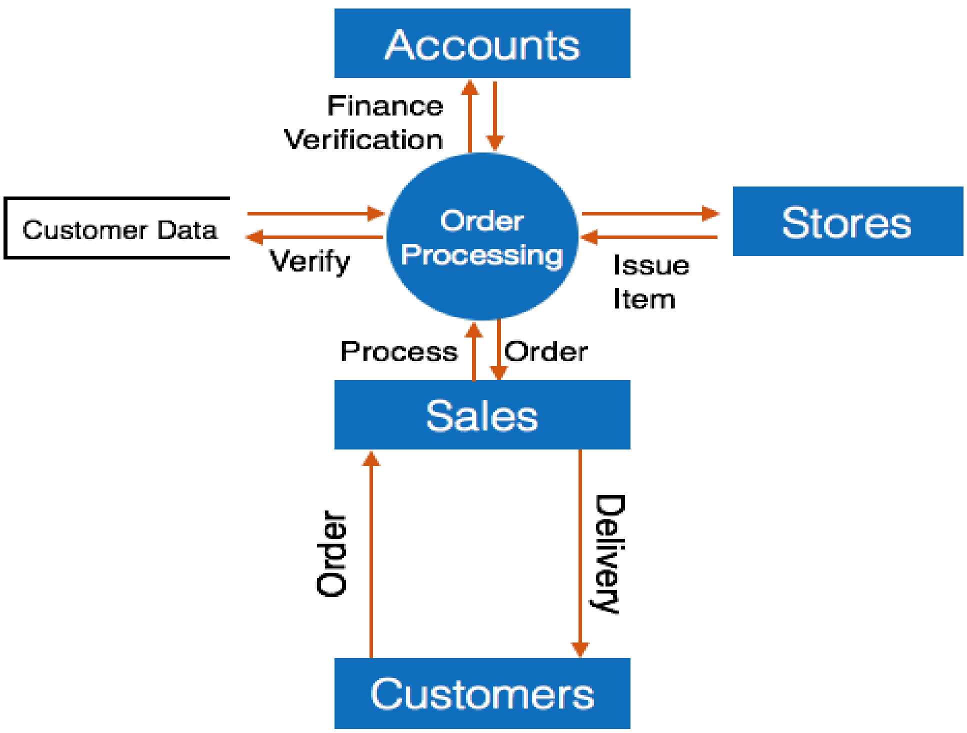
Levels of DFD

Level 0 - Highest abstraction level DFD is known as Level 0 DFD, which depicts the entire information system as one diagram concealing all the underlying details. Level 0 DFDs are also known as context level DFDs.



DFD of an Online Shopping System

Level 1 - The Level 0 DFD is broken down into more specific, Level 1 DFD. Level 1 DFD depicts basic modules in the system and flow of data among various modules. Level 1 DFD also mentions basic processes and sources of information.



Level 2 - At this level, DFD shows how data flows inside the modules mentioned in Level 1.

2. Entity Relationship Diagram (ERD)

Remember

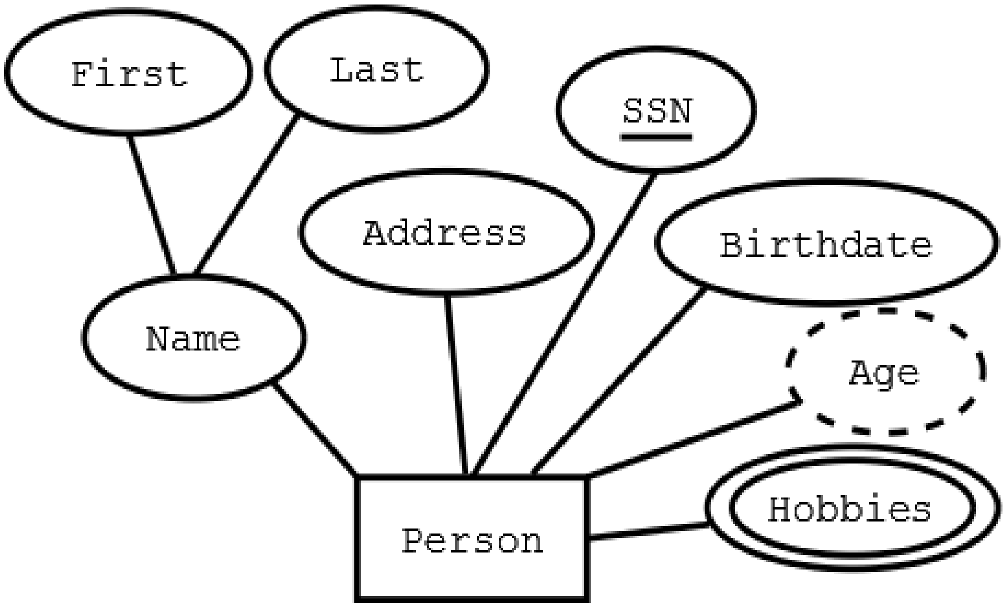
In ERD relationship between entities could be one to one, one to many or many to many.

An entity-relationship (ER) diagram is a specialized graphic that illustrates the relationships between entities in a database.

Any object, for example, entities, attributes of an entity, relationship sets, and attributes of relationship sets, can be represented with the help of an ER diagram.

Entity

It is an object that is involved in the enterprise and that be distinguished from other objects. Entities are represented by means of rectangles. Rectangles are named with the entity set they represent.



Do you know!

It was developed around 1991 by Rumbaugh as a method to develop object-oriented systems and to support object-oriented programming.

Attributes

Attributes are the properties of entities. Attributes are represented by means of ellipses. Every ellipse represents one attribute and is directly connected to its entity (rectangle).

Composite attributes are further divided in a tree like structure. Every node is then connected to its attribute. That is, composite attributes are represented by ellipses that are connected with an ellipse. **Multivalued** attributes are depicted by double ellipse. **Derived** attributes are depicted by dashed ellipse.

3. Object Modeling Technique (OMT)

The object-modeling technique (OMT) is an object modeling approach for software modeling and designing. OMT is a predecessor of the UML. Many OMT modeling elements are common to UML.

Stages:

1. Analysis

Object-oriented analysis builds a real world model.

2. System Design

Determines overall architecture of system.

3. Object Design

Decides upon data structures and algorithms

4. Implementation

Translates design into programming language

Models

1. Functional Model

Data value transformations (dataflow diagrams)

2. Dynamic Model

Control aspects of the system (state diagrams)

3. Object Model

Static structure of objects and their relationships (object diagram)

4. Unified Modeling Language (UML)

Do you know!

UML was created and developed by Grady Booch, Ivar Jacobson and James Rumbaugh at Rational Software during 1994–95

Unified Modeling Language, a standard language for designing and documenting a system in an object-oriented manner. It has different diagrams which can be used in design document to express design of software architecture.

1. Use case diagram

It describes a set of actions (use cases) that some system or systems (subject) should or can perform in collaboration with one or more external users of the system (actors) to provide some observable and valuable results to the actors or other stakeholders of the system(s).

2. Class diagram

Shows structure of the designed system, subsystem or component as related classes and interfaces, with their features, constraints and relationships - associations, generalizations, dependencies, etc.
Elements: class, interface, feature, constraint, association, generalization, dependency.

3. Activity diagram

Shows sequence and conditions for coordinating lower-level behaviors, rather than which classifiers own those behaviors. These are commonly called control flow and object flow models.

4. Sequence diagram

Sequence diagram shows interaction between objects over a specific period time.

5. Component diagram

It shows components and dependencies between them. This type of diagrams is used for Component-Based Development (CBD), to describe systems with Service-Oriented Architecture (SOA).

6. State diagram

Used for modeling discrete behavior through finite state transitions. In addition to expressing the behavior of a part of the system, state machines can also be used to express the usage protocol of part of a system.

7. Deployment diagram

It shows architecture of the system as deployment (distribution) of software artifacts to deployment targets.

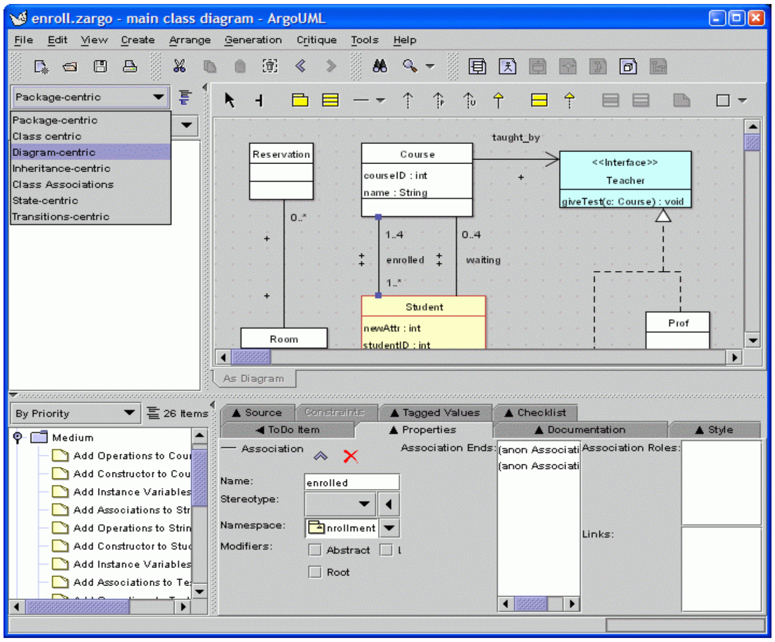
5. UML Tools

A UML tool or UML modeling tool is a software application that supports some or all of the notation and semantics associated with the Unified Modeling Language (UML). Sparx Enterprise Architect, EDraw, Argu UML,etc are some of UML tools.

Building a Use Case Diagram using ArgoUML

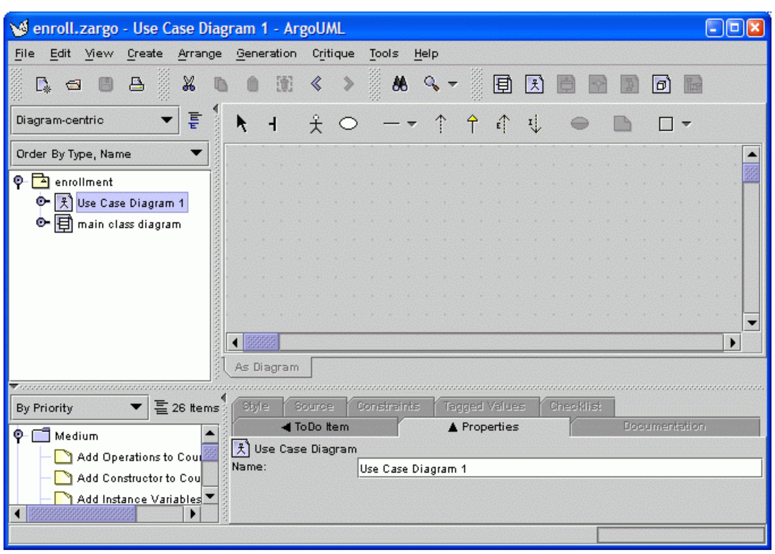
To create Use Case diagram of the "Enroll.zargo" example

1. Open the enroll.zargo Project



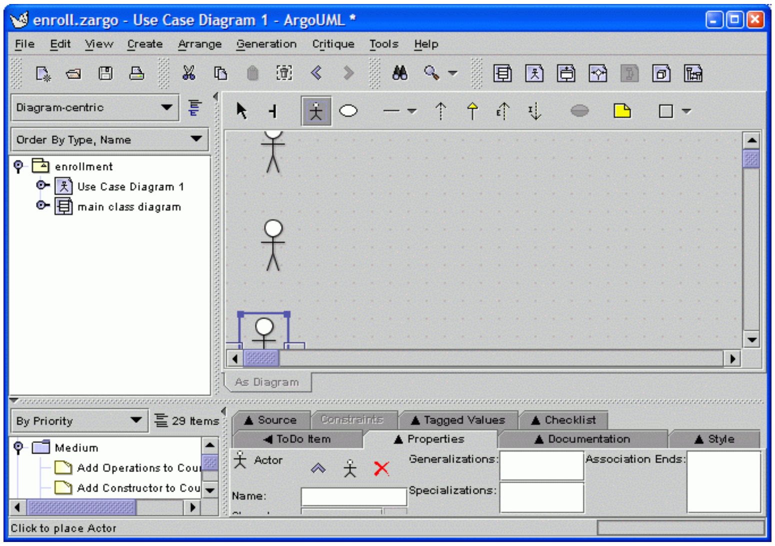
Create a project with name enroll.zargo and change the Explorer perspective from Package-centric to Diagram-centric (see diagram above).

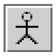
2. Select the Use Case diagram



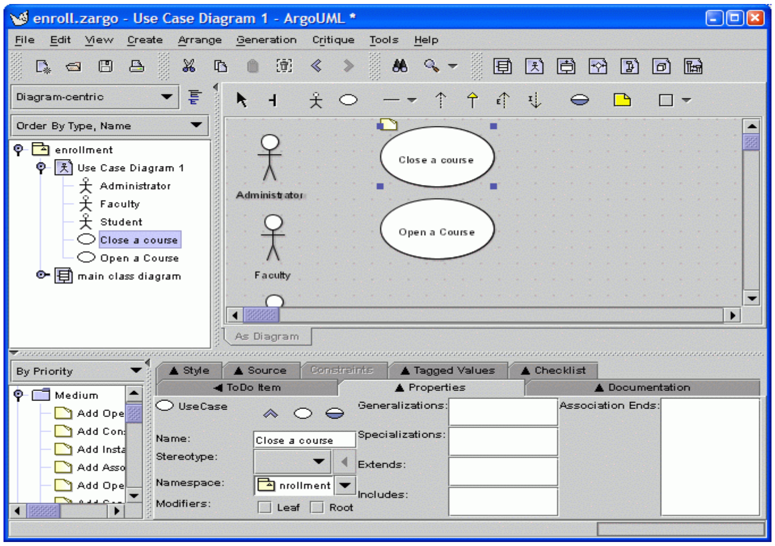
In the Explorer (top-left), by double-clicking on "use case diagram", you will bring up the editor pane for your use case diagram. Notice that you now have a different toolbar displayed. In the name field of the Properties tab in the Details pane (bottom-right), you can rename the diagram to "enrollment use cases".

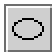
3. Add Actors



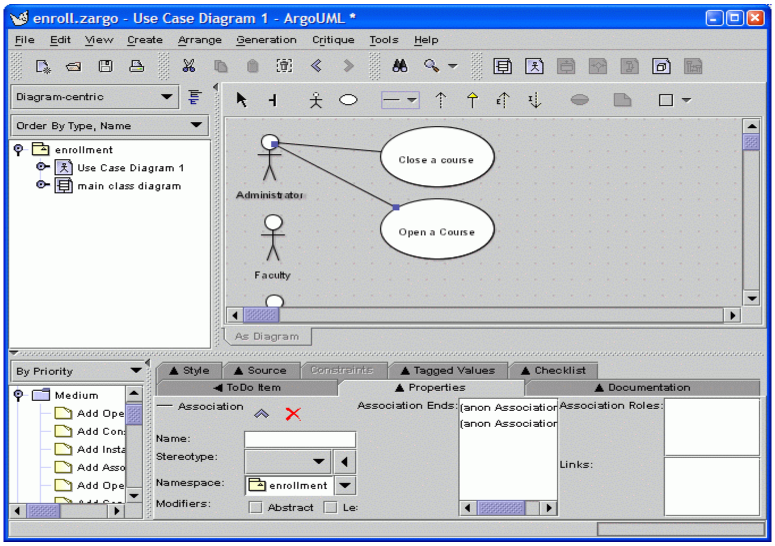
Add three actors to your diagram by double-clicking on  in the toolbar (this is a shortcut that will allow you to add multiple actors without having to go back to the toolbar). Name the actors, from top to bottom, Administrator, Faculty and Student.

4. Adding Use Cases



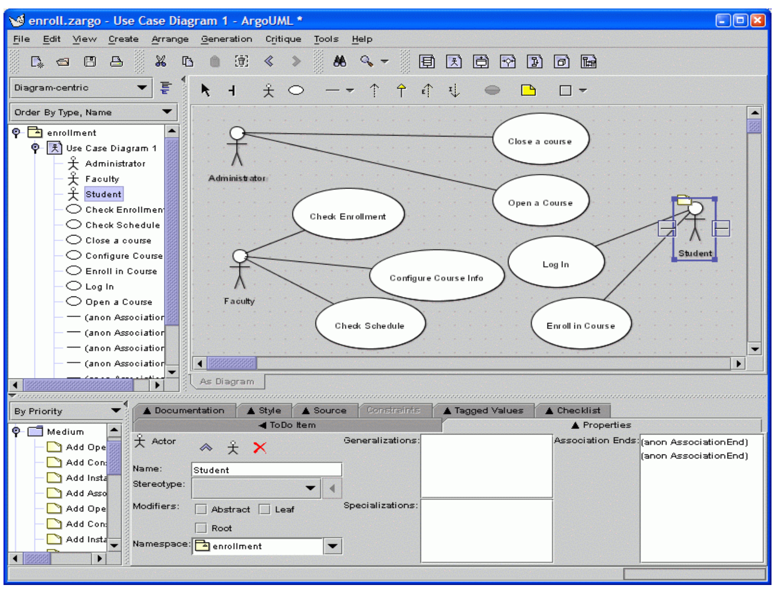
Add two new use cases using  on the toolbar, and name them "Close a Course" and "Open a Course".

5. Adding Associations

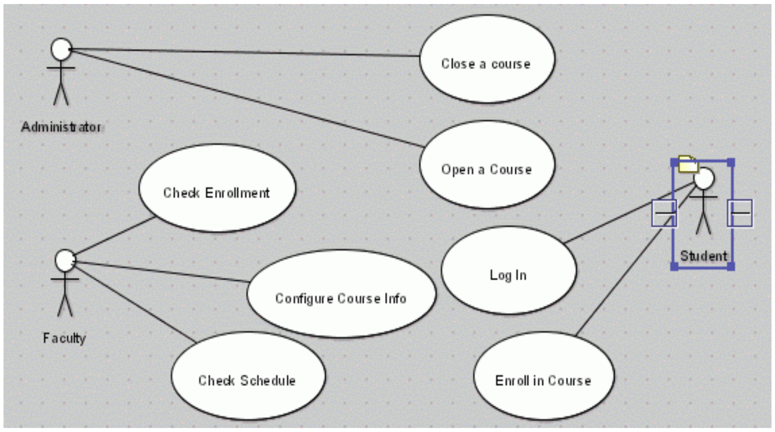


Add two new associations using  on the toolbar.

6. Finish



This is how the final Use Case diagram of the "Enroll.zargo" example.


Administrator
Close a course
Open a Course
Check Enrollment
Faculty
Configure Course Info
Check Schedule
Log In
Enroll in Course
Student

Learning Unit 5: Test Case Design

Overview

Test case design is very important step as they are used to validate that the requirements have been met. On completion of this learning unit, you will be able to understand use case analysis, creation of test cases from use case, designing conditions from operator, specialized testing circumstances and different automated testing tools like UFT, Bugzilla and Issue Tracker.

1. Use Case Analysis

Use case analysis is a technique used to identify the requirements of a system (normally associated with software/process design) and the information used to both define processes used and classes (which are a collection of actors and processes) which will be used both in the use case diagram and the overall use case in the development or redesign of a software system or program. The use case analysis is the foundation upon which the system will be built.

Do you know!

An actor is an entity playing a particular role with respect to the system.

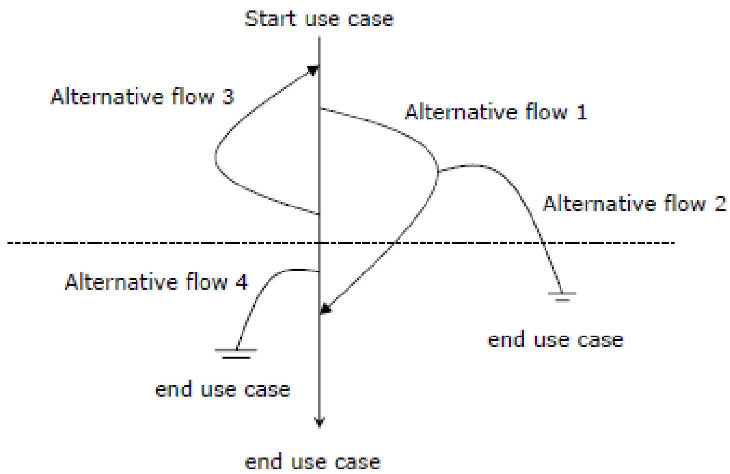
Steps in Use-Case Analysis

1. Identify system boundaries
2. Identify actors:
3. Identify use cases themselves:
    i. Every use case has at least one actor.
    ii. A specific actor initiates the use case.
    iii. The same actor may participate in multiple use cases, as initiator in some and not in others.
4. Create the description including flow of events
5. Identify clarifying scenarios where helpful
6. Provide additional information

2. Designing Test Case from Use Case

Deriving test cases from use cases is a four step process.

1. **Identify the use case scenarios**



Use Case Scenario

- Use simple matrix that can be implemented in a spreadsheet, database or test management tool.
- Number the scenarios and define the combinations of basic and alternative flows that leads to them.
- Many scenarios are possible for one use case
- Not all scenarios may be documented. Use an iterative process
- Not all documented scenarios may be tested
  - Use cases may be at a level that is insufficient for testing
  - Team's review process may discover additional scenarios

Scenario number	Originating flow	Alternative flow	Next alternative	Next alternative
1	Basic flow			
2	Basic flow	Alt. flow 1		
3	Basic flow	Alt. flow 1	Alt. flow 2	
4	Basic flow	Alt. flow 3		
5	Basic flow	Alt. flow 3	Alt. flow 1	
6	Basic flow	Alt. flow 3	Alt. flow 1	Alt. flow 2
7	Basic flow	Alt. flow 4		
8	Basic flow	Alt. flow 3	Alt. flow 4	

2. Identify the test cases

Usecase Scenario

The steps required to go through and then achieve a user goal.

Parameters of any test case:

- Conditions
- Input (data values)
- Expected result
- Actual result

Test case ID	Scenario/ condition	Data value 1	Data value 2	Data value N	Exp. results	Actual results
1	Scenario 1					
2	Scenario 2					
3	Scenario 3					

3. **Identify the test conditions**
   - For each test case identify the conditions that will cause it to execute a specific events.
   - Use matrix with columns for the conditions and for each condition state whether it is
     - Valid (V): must be true for the basic flow to execute.
     - Invalid (I): this will invoke an alternative flow
     - Not applicable (N/A): to the test case
4. **Add data values to complete the test cases**
   - Design real input data values that will make such conditions to be valid or invalid and hence the scenarios to happen.
   - You may want to look at the use case constructs and branches.

3. Design Conditions from Operators

Condition testing is a test case design method that exercises the logical conditions contained in a program module. A simple condition is a Boolean variable or a relational expression, possible preceded with Not (!) operator .A relational expression takes the form
E1 < relational –operator > E2

Where E1 and E2 are arithmetic expressions and <relational –operator> is one of the following ==, !=, ||, && etc.

Comparison and Logical operators are used to test for *true* or *false*.

Comparison Operators

Comparison operators are used in logical statements to determine equality or difference between variables or values.
Given that x = 5, the table below explains the comparison operators:

Operator	Description	Comparing	Returns
==	equal to	x == 8	false
		x == 5	true
!=	not equal	x != 8	true
>	greater than	x > 8	false

<	less than	x < 8	true
>=	greater than or equal to	x >= 8	false
<=	less than or equal to	x <= 8	true

Comparison operators can be used in conditional statements to compare values and take action depending on the result:

Logical Operators

Logical operators are used to determine the logic between variables or values.
Given that x = 6 and y = 3, the table below explains the logical operators:

Operator	Description	Example
&&	and	(x < 10 && y > 1) is true
||	or	(x == 5 || y == 5) is false

4. Specialized Testing Circumstances

Stress

In this testing circumstances the robustness of software if determined by testing beyond the limits of normal operation. Stress testing is particularly important for "mission critical" software, but is used for all types of software. Stress tests commonly put a greater emphasis on robustness, availability, and error handling under a heavy load, than on what would be considered correct behavior under normal circumstances.

Load-Balancing

Load balancing ensures high system availability through the distribution of workload across multiple components. Using multiple components with load balancing, instead of a single component, may increase reliability through redundancy.

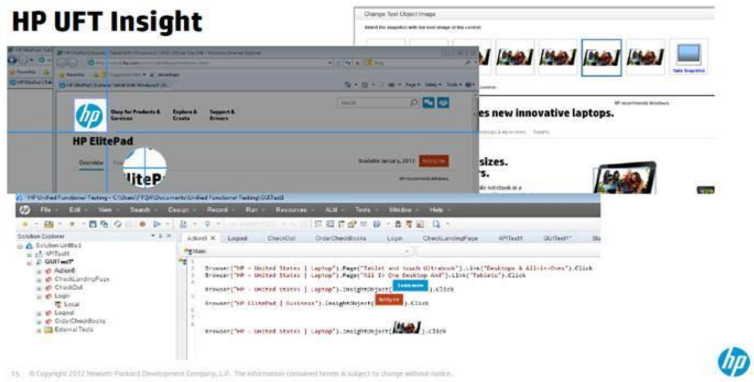
Page Level Security

Page-level security allows you to set different levels of access for different people on different pages. For example, you could allow one group to see one set of pages, allow others to edit another set of pages, and then keep yet another set of pages private only to yourself.

5. Testing Tools

Unified Functional Testing (UFT)

UFT formerly known as QuickTest Professional (QTP), is an automated functional testing tool that helps testers to perform automated regression testing in order to identify any gaps, errors/defects in contrary to the actual/desired results of the application under test.



Bugzilla

Bugzilla is an open source web-based general-purpose bugtracker and testing tool. It has been adopted by a variety of organizations for use as a bug tracking system for both free and open-source software and proprietary projects and products.

Issue Tracker

Issue Tracker, formerly IssueZilla, is the software used for tracking bugs and feature requests for OpenOffice.org or issues from another type. It was forked long ago by CollabNet from Mozilla's Bugzilla.

Summary of Module

- E-commerce describes the process of buying, selling, transferring, or exchanging of products, services, and/or information via computer networks, including the Internet. Electronic commerce draws on technologies such as E-tailing, Electronic Funds Transfer and Electronic Data Interchange Ecommerce can be broken into four main categories: Business to Business, Business to Consumer, Consumer to business, and Consumer to consumer

- Market Intelligence to identify the opportunities for a product/service can be achieved through Trend Analysis, Competitive Intelligence and Decision Making for Market Segmentation.

- In requirement analysis functional requirements and Requirement traceability matrix are created for determining the needs or conditions to meet for a new or altered product or project.

- Data Flow Diagram, Entity Relationship Diagram, Object Modeling Technique and Unified Modeling language are different techniques of designing.

- Test cases are designed from use cases as they are necessary to verify successful and acceptable implementation of the product requirements.

Frequently Asked Questions (FAQs)

FAQ 1:	Name any two Ecommerce web applications?
Answer	eBay, Pay Pal, Amazon, Digital River etc.
FAQ 2:	When was eBay founded?
Answer	eBay was launched in 1995.
FAQ 3:	What is e-Tailing?
Answer	Short for "electronic retailing. E-tailing is the selling of retail goods on the Internet.
FAQ 4:	What are the benefits of using EFT?
Answer	Using EFT reduces paper processing and the errors associated with such processing, reduces costs related to check processing and postage and allows for faster response times to inquiries regarding the status of tax payments.
FAQ 5:	What is Business to Business ecommerce?
Answer	In a B2B, companies sell their online goods to other companies without being engaged in sales to consumers.
FAQ 6:	How Do I Get a PayPal Account?
Answer	It's easy to get a PayPal account. From the PayPal account registration page, select Personal or Business Account, then choose the country you live in. Next, on the PayPal Account Sign Up page, enter your information, then click Sign Up.
FAQ 7:	Define UML?
Answer	Unified Modeling Language, a standard language for designing and documenting a system in an object-oriented manner. It has nine diagrams which can be used in design document to express design of software architecture.
FAQ 8:	How many stages are there in OMT?
Answer	Object Modeling Technique has four stages. 1. Analysis 2. System Design 3. Object Design 4. Implementation
FAQ 9:	What are the different types of DFDs?
Answer	Data Flow diagrams are categorized as either logical or physical.
FAQ 10:	What is UFT?
Answer	Unified Functional Testing is an automated functional testing tool that helps testers to perform automated regression testing in order to identify any gaps, errors/defects

Test Yourself!

Please mark the correct one from the given options. You can check your answer with the Answer Key at the end of this module.

1. The term e-commerce includes_________.

a. Electronic trading of Physical goods and intangibles such as information.

b. The electronic provision of services such as after sales support or online legal advice

c. All the steps involved in trade, such as on-line marketing ordering payment and support for delivery.

d. All of the above.

2. What is the full form of EFT?

a. Electronic Funds Transfer

b. Efficient Funds Transfer

c. Effective Funds Transfer

d. Electronic Foreign Transfer

3. Which of the following is the largest community in classification of e-commerce?

a. Business to Business (B2B)

b. Business to Consumer (B2C)

c. Business to Government (B2G)

d. Government to Government (G2G)

4. Which of the following is not the example of business to consumer (B to C) e-commerce?

a. Amazon.com

b. e-bay.com

c. dell.com

d. lastminute.com)

5. The types of Business to Business e-commerce are______.

a. Direct selling and support to Business

b. Industry portals

c. Information sites about a industry

d. All of the above

6. What is true about a Sequence Diagram?

a. It describes the behavior in many Use Cases.

b. It doesn't describe the behavior in a single Use Case.

c. It describes the behavior of a single object.

d. It describes the behavior of several objects

7. The entity relationship set is represented in E-R diagram as ________.

a. Double diamonds

b. Undivided rectangles

c. Dashed lines

d. Diamond

8. **Consider a directed line (----->) from the relationship set advisor to both entity sets instructor and student. This indicates _________ relationship.**

a. One to many
b. One to one
c. Many to many
d. Many to one

9. **________help you to design a series of test cases that have a high likelihood of finding errors.**

a. Requirement document
b. software testing techniques
c. Project plan
d. SRS

10. **A set of inputs, execution preconditions and expected outcomes is known as a ____________**

a. Test plan
b. Test case
c. Test document
d. Test Suite

Answer Keys

MCQ Number	Correct Answer
1	d
2	a
3	a
4	b
5	d
6	d
7	d
8	b
9	b
10	b

Module 2: Web Design / Development

Learning Outcomes

After completion of this learning module, you will be able to:

- Use web designing languages for ecommerce enabled web applications
- Use different ecommerce frameworks for web application development
- Create database for web applications
- Apply security for web applications
- Understand payment modes for online ecommerce stores

Learning Unit 1: Software Language (Web Development)

Overview

Web design and development is a broad term for the work involved in developing and designing a web site. On completion of this learning unit you will be able to understand: coding standards, Object oriented programming concepts in web development, unit testing, coding terminologies, coding techniques, development of sitemap technique to apply logical conditions, and integrate traceability options.

Remember

Many programmers have a nasty habit of overly abbreviating everything. This should be discouraged.

1. Coding Standards

Source Code

Do not use any libraries or code from external sources without prior approval.

1) Similar code may already exist
2) Licensing may be an issue
3) Legibility and reusability can be issue
4) Performance concerns

Coding Standards

It is simply a set of rules and guidelines for formatting of source code.

Conventions

Indenting:

Indent your code. Use an indent of 4 spaces, with no tabs.

Case

Use "**lowerCamelCase**" style to name functions, methods, and variables.

Do you know!

lowerCamelCase is lowercase lettering on initial words and capitalization on subsequent words. UpperCamelCase is capitalization on all words

Variables

Case should never be used to differentiate between variable names. Every variable name in the current scope should be absolutely unique. Variable names should describe the content that they (will) contain, using either complete words or understandable abbreviations. You can use underscore, hyphen sign in variable.

Functions

No underscores except in the event handlers. Try to avoid abbreviations. PHP functions are equivalent to a spoken language's verbs. Function names, therefore, should be action oriented. They should also be defined in the present tense. Function name should look like what it does.

- Use "UpperCamelCase" style to name classes
- Define constants with uppercase letters and underscores

Constants:
SCREAMING_CAPS
Ex: define ("GLOBAL_CONSTANT","1");

Remember

We are using PHP as web programming language for reference here.

Function Declarations/Definition

Function declarations are the step where you define your function. Its parenthesis for argument can be empty or with argument.

With argument:

```
<?php
function fooFunction($arg1, $arg2 = '')
{
if (condition) {
statement;
}
return $val;    // function returning the value can be use in future
}
?>
```

Without argument:

```
<?php
function fooFunction( )
{
if (condition) {
statement;
}
return $val;
}
?>
```

Function Calls

After function declaration next step is to call the function to get the result whenever you need. Blow is the example how to call the function

Calling with argument

foo($bar, $baz, $quux);

calling without argument

foo( );

PHP Code Tags

Always use <?php ?> to define PHP code, not the <? ?> shorthand.

Control Structures

Allman/BSD Style

In Allman styles sometimes known as BSD style, braces appear alone and surrounding the indented code.

- Place a single space between the control keyword (if, for, while, switch, etc.) and opening parenthesis to distinguish control statements from function calls
- Always use curly braces { }—even when technically optional (i.e., avoid PHP's alternative syntax for control structures, except the ternary operator noted below)
- **Include break**; statement after all switch case statements
- Use the **Allman/BSD** style for indentation and layout
- Always use **elseif** (one word) in place of else if (two words)

Example:

```php
<?php
if ((condition1) || (condition2)) {
action1;
} elseif ((condition3) && (condition4)) {
action2;
} else {
defaultaction;
}
?>
```

Ternary Operators

Can be used for simple true/false/action checks.

($result)? echo "<result>success</result>":echo "<result>failure</result>" ;

Directories, File Structure

- Do not create new directories or class, library files without first discussing with team. Most functions, classes belong in existing files.
- New plug-in, and files should follow existing layout and naming.

> **Remember**
>
> Many programmers have a nasty habit of overly abbreviating everything. This should be discouraged.

Passwords

- Never hardcode passwords into any script
- Never put live data passwords into SVN

Database Tables and Fields

- Plural, lowercase words separated by underscores:
  - *items*
  - *item_specifications*
- Do NOT make calls directly to native database functions (ie: mysql_insert_id, mysql_result,etc). Use ONLY ADOdb functions.

> **ADOdb**
>
> ADOdb is a database abstraction library for PHP. It allows developers to write applications in a fairly consistent way regardless of the underlying database system storing the information.

Database

- Don't distribute database information. (via email, download or otherwise)
- Do not connect to production server from home (only dev).
- Do not run test or live queries on production data.

User Data

- All Credit Card information should be encrypted.
- User data should be obfuscated before being used in development environments.

TODO

Anytime you need to make comments regarding future modifications or requirement put a //TODO: comments. These will show up in PHPEclipse and give us an idea of things left unfinished (but functional). Example:

// TODO: This code should be re-examined for increased performance

CODE CLEANUP

Where you see standard rules broken -> MARK CODE WITH A TODO

PHP Comments

Use C-style (/* */) comments for multi-line statements and C++ comments (//) for single line statements

HTTP Methods

Always prefer to use HTTP POST method rather than using GET method.

HTML

When you writing html code you should follow the following standards.

- Use correct document type (<!DOCTYPE html>)
- Use lower case element like
    - **Bad**
      <SECTION>
      <p>This.</p>
      </SECTION>
    - **Good**
      <section>
      <p>This.</p>
      </section>
- Close all html element

```
<section>
  <p>This is a paragraph.</p>
  <p>This is a paragraph.</p>
</section>
```

- **Use Lower Case Attribute Names**
  <div class="menu">
- **Quote Attribute Values**
  <table class="table striped">
- **Spaces and Equal Signs**
  <link rel = "stylesheet" href = "styles.css">
- **Avoid Long Code Lines**
  When you write html code avoid long code line try to avoid code lines longer than 80 character
- **Blank line and indentation**
  Don’t add blank line without a reason. Do not use unnecessary line and indentation
- **Omitting some tags**
  In html 5 you can omit html, body, and head tag
- **Use of comments**
  Comments are more important in coding. Other developer can easily understand your code and different portion of the code and its purpose.

2. Object Oriented Programming Concepts

Object-oriented programming (OOP) is a programming language model organized around objects rather than "actions" and data rather than logic. In object oriented programming programmer has been viewed as a logical procedure that takes input data, processes it, and produces output data.

Benefits of Object Oriented Programming

Some of the benefits mentioned include:

- Ease of maintenance
- Reuse of code
- Easily modified, extended, and improved
- Better tools to solve problems
- Easier for others to work with your code

Principles of Object Oriented Programming

There are 4 major principles to object oriented programming.

1. Abstraction

Through the process of abstraction, a programmer hides all but the relevant data about an object in order to reduce complexity and increase efficiency.

2. Encapsulation

Encapsulation is the packing of data and functions into a single component. The features of encapsulation are supported using classes in most object-oriented programming languages, although other alternatives also exist.

3. Polymorphism

In object-oriented programming, polymorphism refers to a programming language's ability to process objects differently depending on their data type or class. More specifically, it is the ability to redefine methods for derived classes. There are several ways to look at polymorphism itself.

- The object can be of multiple types
- The form something takes is determined at runtime
- The form is based on the parameters given to the object
- If B is a descendant of A and a function can accept A as a parameter, it can also accept B

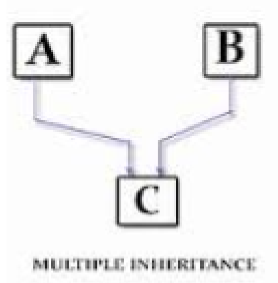
A big advantage of polymorphism is the reusability and extensibility of higher level abstractions. The higher the abstraction that can be reused, the more reliable and less expensive the end result of the project.

4. Inheritance

In object-oriented programming (OOP), inheritance is when an object or class is based on another object (prototypal inheritance) or class (class-based inheritance), using the same implementation (inheriting from an object or class) specifying implementation to maintain the same behavior (realizing an interface.

Do you know!

If no unit testing was done before integration, trying to hunt down the problem is immensely more complicated.



3. Unit Testing

In unit testing you can divide your code should be in the form of different units and you can test each unit individually. The primary goal of unit testing is to take the smallest piece of testable software in the application, separate it from the remainder of the code, and determine whether it behaves exactly as you expect.

The most common approach to unit testing requires drivers and stubs to be written. The driver simulates a calling unit and the stub simulates a called unit. Even though the drivers and stubs cost time and money, unit testing provides some undeniable advantages.

4. Coding Terminologies

Do you know!

Stubs are programs that simulate the behaviors of software components (or modules) that a module undergoing tests depends on.

Anchor Text

The text a link uses to refer to your site.

Client-side

Client-side refers to scripts that are run in a viewer's browser, instead of on a web server (as in server-side scripts).

Comment

In web designing and development a comment is a bit of information contained in a site's html or xhtml files that is ignored by the browser. Comments are used to identify different parts of the file and as reference notes as well as ease in user readability.

Doctype

The doctype declaration specifies which version of html is used in a document. It has a direct effect on whether your html will validate.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
```

Element

In xml, an element is the central building block of any document. Individual elements can contain text, other elements, or both.

Em

Em is a unit of measurement for sizing fonts and other elements within a web page relative to the item's parent element.

Remember

A 1em font is equal to the point size for the font already defined in the parent element.

EX

Ex is a measurement for font height or size relative to the height of a lowercase "x" in that font family.

Font Family

The font family tag generally lists multiple fonts to be used, and usually ends with the generic font category (such as "serif" or "sans-serif').

Front-end

The front-end is basically the opposite of the back-end. It's all the components of a website that a visitor to the site can see (pages, images, content, etc)

Hexadecimal

Also referred to a "hex" numbers, they are a base-16 numbering system used to define colors online.

Htaccess

The .htaccess file is the default directory-level configuration file on apache servers.

Html tag

Also referred to as an html element, an html tag is the bit of code that describes how that particular piece of the web page it's on is formatted.

Iframe

Short for inline frame. An iframe is used to display one or more web pages within another normal web page

Image map

An image map is used in xhtml to allow different parts of an image to become different clickable elements (and can also allow some portions of the image to have no clickable element).

Inheritance

In css, elements that don't have a pre-defined style will take on the style of their parent element within the document tree.

Inline style

Elements with css written directly around the element it affects, instead of in a separate style sheet or header style.

Liquid/Responsive layout

Layout that is based on percentages of the browser window's size and adjustable on any screen type exp laptop, tablet, mobile, handhelds etc.

Markup

This refers to the coding applied to a text document to change it into an html, xml, or other markup language document.

Meta data

Meta data is the data contained in the header that offers information about the web page that a visitor is currently on. The information contained in the meta data isn't viewable on the web page (except in the source code). Meta data is contained within meta tags.

Meta tag

An html tag used to include meta data within the header of your web page.

Nesting

Nesting refers to putting one html element within another element.

Permalink

A link that is the permanent web address of a given blog post.

Plug-in

A bit of third party code that extends the capabilities of a website.

Property

This is what defines how a style should appear on a given web page.

Pseudo-element

It is an element used to add a special effect to certain selectors.

Really simple syndication

Rss is a standardized xml format that allows content to be syndicated from one site to another.

Script

Generally refers to a portion of code on an html page that makes the page more dynamic and interactive.

Selector

In css, the selector is the item a style will be applied to.

Semantic markup

In semantic markup, content is written within xhtml tags that offer context to what the content contains.

Server-side

Server-side refers to scripts run on a web server and the code compile on server, as opposed to in a user's browser.

5. Coding Techniques

Following coding techniques should be used.

1. No matter how much SPACE's you use for an indent use it consistently throughout the source code.
2. Indent code to better convey the logical structure of your code. Without indenting, code becomes difficult to follow.
3. Establish a maximum line length for comments and code to avoid having to scroll the window of the text
4. Use SPACE after each "comma" in lists, such as array values and arguments, also before and after the "equal" of an assignment
5. Use empty lines to provide organizational clues to source code, blocks ("paragraphs"-like structure) help the reader in comprehending the logical segmenting.
6. When a line is broken across several lines, make it obvious that the line is incomplete using indentation.
7. Avoid placing more than one statement per line
8. Enable syntax highlighting in your text editor.
9. Use freely available program that help to indent, format, and beautify your source code automatically and consistently.
10. Break large, complex sections of code into smaller, comprehensible modules (subroutine/functions/methods). A good rule is that modules do not exceed the size of the text editor window.
11. Arrange and separate your source code logically between files.
12. Choose and stick to a style for naming various elements of the code, this is one of the most influential aids to understand the logical flow. A name should tell what rather than how, avoid names that expose underlying implementation.
13. Ideally you would like to be able to read the code as prose.

14. In Object-Oriented languages, it is redundant to include the class name in the name of a member field or function.

15. Even for short-lived variable, use a meaningful name. Use single-letter variable (i, j) for short-loop indexes only.

6. Development of Site Map

Sitemap

A sitemap is a dedicated page that lists and links to all the other pages on your website, often providing metadata about each URL. There are two types of them:

1. HTML Sitemap

An HTML site map to allow human visitors to easily navigate on your website.

2. XML Sitemap

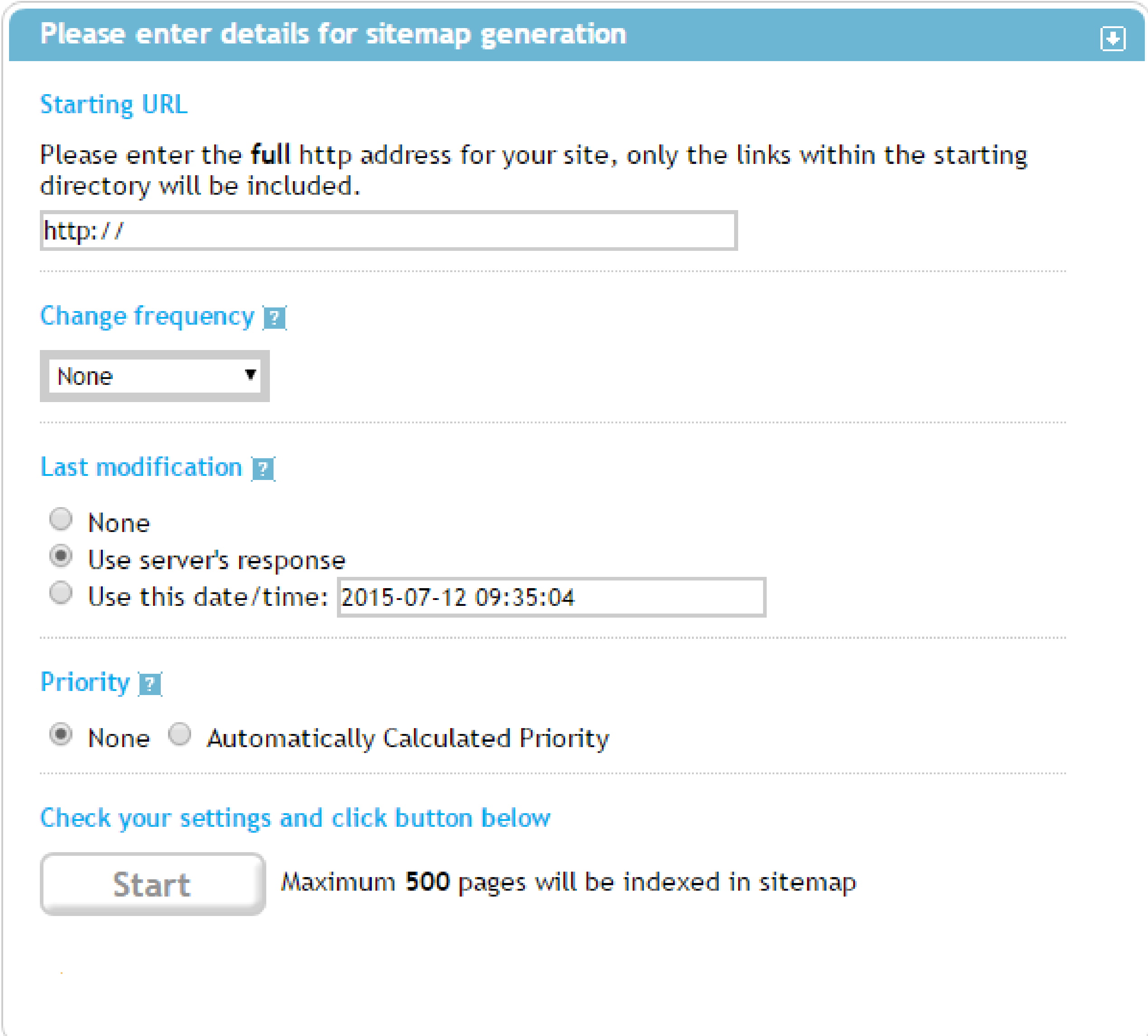
An XML sitemap that can be submitted to Google, Bing, Yahoo and other search engines to help them crawl your website better.

Development of Sitemap

Sitemap can be developed using different tools. Here is the method to create sitemap using free online sitemap generator.

Step by step creating sitemap

1. **Open** https://www.xml-sitemaps.com/
2. Enter your full website **URL** and some optional parameters in the form below.



3. Press '**Start**' button and wait until the site is completely crawled.
4. You will be redirected to the generated sitemap details page, including number of pages, broken links list, **XML** file content and link to a sitemap file. Download the sitemap file using that link and put it into the domain root folder of your site.
5. **Go** to your Google Webmaster account and add your sitemap URL.

Learner's Activity

Developing a front end webpage.

Description: This activity consists of an interactive session in the class about developing front end of an ecommerce web application using HTML, JavaScript and JQuery.

Time Guideline: 1 hour and 30 Minutes.

Purpose: To be able to develop front end web page of an ecommerce web application.

Presentation:

1- Divide the class into groups of five.

2- Brief the groups about the activity that each group will create front end of an ecommerce web application using HTML, JavaScript and JQuery.

3- Groups will perform this task.

4- Groups will demonstrate their work.

Learning Unit 2: Framework

Overview

Framework is one of the tools to help you develop better and faster. On completion of this learning unit you will be able to understand software development using frameworks, different open source frameworks (like Spring MVC, JSF, Struts etc.), and developing software applications using libraries.

Remember

The software frameworks significantly reduce the amount of time, effort, and resources required to develop and maintain applications.

1. Frameworks

A framework is a platform for developing software applications. It provides a foundation on which software developers can build programs for a specific platform. For example, a framework may include predefined classes and functions that can be used to process input, manage hardware devices, and interact with system software. This simplifies the development process since programmers don't need to reinvent the wheel each time they develop a new application.

Do you know!

Struts was originally developed by Craig McClanahan and donated to the Apache Foundation in May 2000.

Advantages of using a framework

1. Most of the popular frameworks in many languages are open-source
2. As any other distributed tool, a framework usually comes with documentation, a support team, or big community forums where you can obtain quick answers.
3. Tasks that usually would take you hours and hundreds of lines of code to write can now be done in minutes with pre-built functions.
4. A widely used framework has big security implementations. The big advantage is the community behind it, where users become long-term testers. If you find vulnerability or a security hole, you can go to the framework's website and let the team know so they can fix it.

Popular Frameworks

1. **Spring MVC**

   The Spring web MVC framework provides model-view-controller architecture and ready components that can be used to develop flexible and loosely coupled web applications. For Further Information Official page of spring MVC is: http://projects.spring.io/spring-framework/

2. **JSF**

   JavaServer Faces (JSF) is a MVC web framework that simplifies the construction of user interfaces (UI) for server-based applications by using reusable UI components in a page. For Further Information Official page of JSf is: https://javaserverfaces.java.net/

3. **Struts**

Apache Struts 1 is a discontinued open-source web application framework for developing Java EE web applications. It uses and extends the Java Servlet API to encourage developers to adopt a model–view–controller (MVC) architecture. For Further Information Official page of struts is: https://struts.apache.org/

4. **CodeIgenator**

CMS

A content management system (CMS) is a computer application that allows publishing, editing and modifying content, organizing, deleting as well as maintenance from a central interface.

CodeIgniter is an open source rapid development web application framework, for use in building dynamic web sites with PHP. For Further Information Official page of CodeIgenator is: http://www.codeigniter.com/

5. **Zend**

Zend Framework (ZF) is an open source, object-oriented web application framework implemented in PHP 5 and licensed under the New BSD License. For Further Information Official page of zend is: http://framework.zend.com/

6. **Entity Framework**

Entity Framework (EF) is an open source object-relational mapping (ORM) framework. It is an enhancement to ADO.NET that gives developers an automated mechanism for accessing & storing the data in the database.

2. Developing the Software Application using Framework

E-commerce Framework is a software technology solution that allows you to build storefronts. There are many E-commerce frameworks available in the market that can be used as an E-commerce platform for your business. In order to determine which one is best for your online business, it is essential to understand their characteristics and functionality. Well-known ecommerce frameworks are

Drupal Ecommerce

Drupal Commerce is the best way to manage or configure your ecommerce website according to your needs. It has very rigid development standards, and comes with features designed for maximum flexibility. Out of its many features, Drupal Commerce comes with the advantage of creating different custom attributes, VAT (value added tax) support, tax calculation and even discount pricing rules. You even get dynamic product displays and order management means and methods for smooth running of your website.

WordPress Ecommerce

WordPress is one of the pioneers in php CMS in the field of building websites/web application from scratch, and with exciting features. It packs a punch in terms of useful features for CMS systems. Of the many WordPress Ecommerce features is the fact that not only can store owners use the readymade ecommerce templates, but can also explore design differentiation with CSS and HTML. These packs come with video tutorials for easy setups, and there are integrations with popular payment gateways such as Stripe, Gold Cart, and the best part is, you can integrate automatic pricing modules and offer complicated discounts and refunds to frequent shoppers. There are some top plug-in in WordPress are Wo-commerce, wp-ecommerce etc.

VirtueMart

It is a free, open-source ecommerce plug-in. It works in tandem with the renowned Joomla CMS. VirtueMart is a complex ecommerce plugin which is not for the average business as it works on an entirely different platform. But, left in the hands of an experienced web developer or programmer, installing, implementing and maintaining the platform successfully can provide some very long term benefits.

Magento

Magento is an open source ecommerce framework that one can use to fuel the growth of online stores and content shops offering downloadable content, for free! Developers have the flexibility to alter the core codes as well as add features and even improve functionality by installing extensions through the “Magento Connect” platform. Magento is ideal for those looking to optimize back-end workflows of their businesses.

3. Framework Libraries

A library generally consists of pre-written code, classes, procedures, scripts, configuration data and more. Typically, a developer might manually add a software library to a program to achieve more functionality or to automate a process without writing code for it. For example, when developing a mathematical program or application, a developer may add a mathematics software library to the program to eliminate the need for writing complex functions. All of the available functions within a software library can just be called/used within the program body without defining them explicitly. Similarly, a compiler might automatically add a related software library to a program on run time.

Step by Step Creating a web store using Magento

Following are the basic steps to start a new online store with Magento and start selling your products.

1. **Installation**

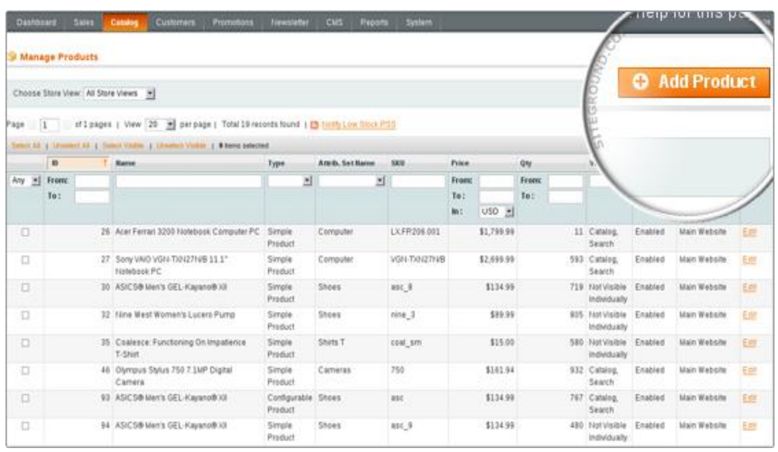
   Download and Install latest Magento. Once you have completed the Magento installation, you can proceed with the configuration of your web site.

   https://www.magentocommerce.com/**download**

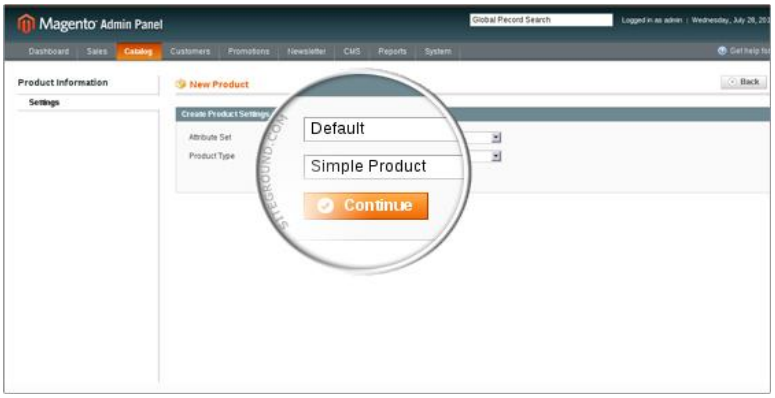
2. **Adding And Managing Products In Your Magento Website**

   Adding Products in Magento

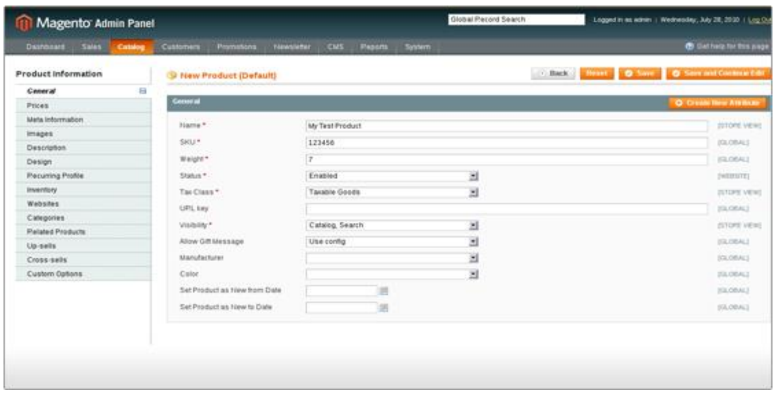
   You can add products from the Magento Admin area -> Catalog -> Manage Products -> Add Product



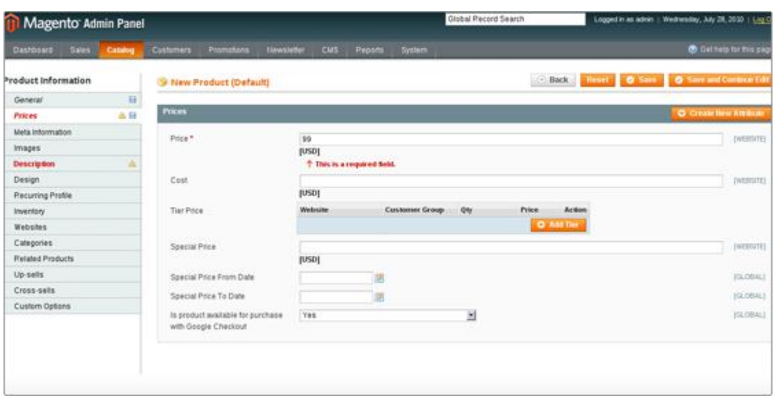
Select the product's settings (Attribute Set and Product Type) and click Continue.



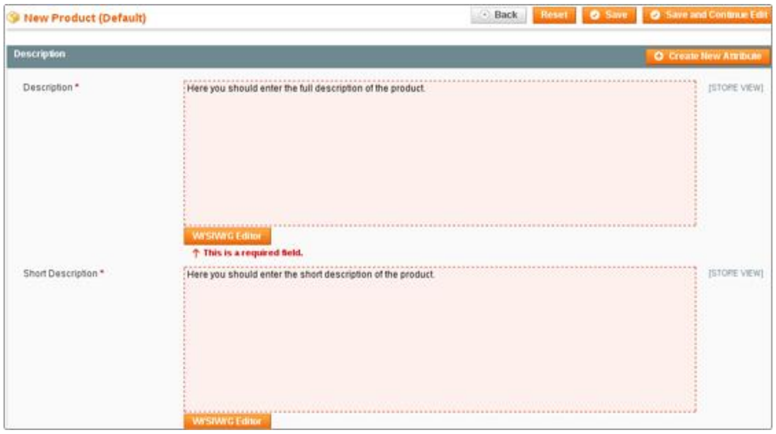
On the next page you will have to fill in the product options (Name, SKU (Stock Keeping Unit), Weight, Status (Enabled/Disabled), Tax Class, etc). You can also add custom attributes to the product using the Create New Attribute button.



When ready, click Save and Continue Edit to go to the next step. Here you will have to fill in the price for your product. You can also add additional price options such as Tier Price and Special Price.



Click Save and Continue Edit to go to the next screen where you will be asked to enter some description for your product.

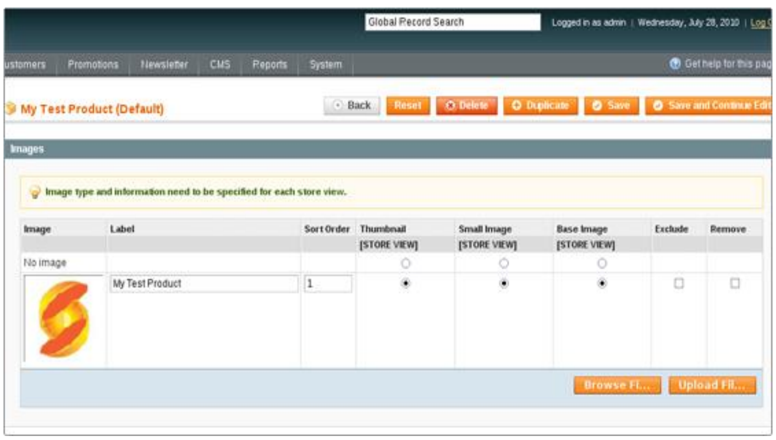


Click **Save** and Continue Edit and the product will be saved. You can further customize the product from the Product Information menu on the left. In order for the product to show up on your front page, make sure you set it as In Stock from the Inventory option in the left menu.

Adding Images to Your Products

Adding an image to a product in Magento is simple. All you need to do is select the product which you want to add an image to from the product list available

1. In the Magento **admin area** Catalog => Manage Products
2. Once the product selected, **click** the **Images** option available in the Product Information menu
3. On the left **Click Browse** Files and locate the file on your computer which you want to use as a product image.
4. Then **click** Upload Files to upload the image to your shop. Finally, label your image and choose where it should appear using the radio buttons
5. On the right. **Click** Save to save your product's image.



Managing Product Attributes

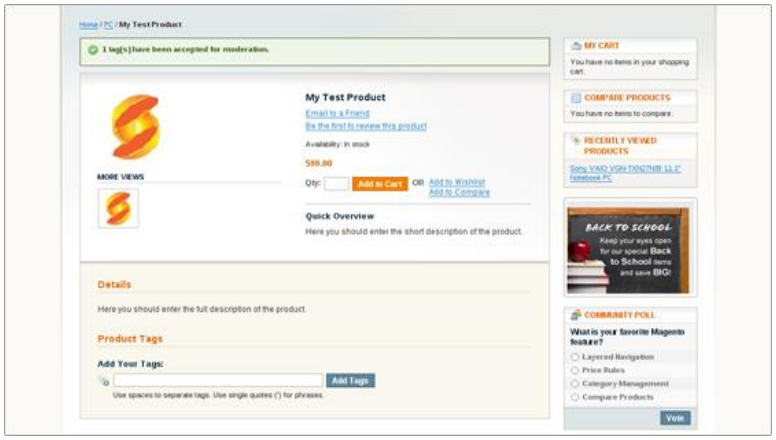
1. **Clicking** on the [Create New Attribute] button will allow you to add attributes to your products:

2. Once you are ready with the attribute, click on the [Save Attribute] button. Then you can click on the [Save] button in order to store your product information. Finally, you need to assign the new product to a chosen category:

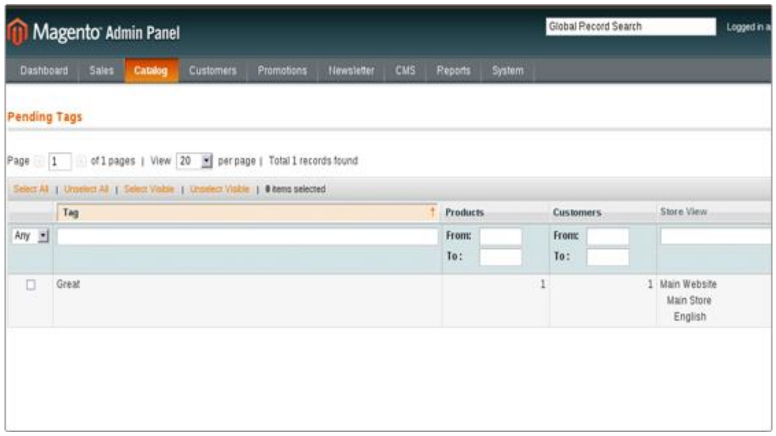
Managing Product Tags

By default Magento includes the option to allow customers to tag your products. When a customer tags a certain product, the tag appears as pending and must be approved before it can show up on the product page.

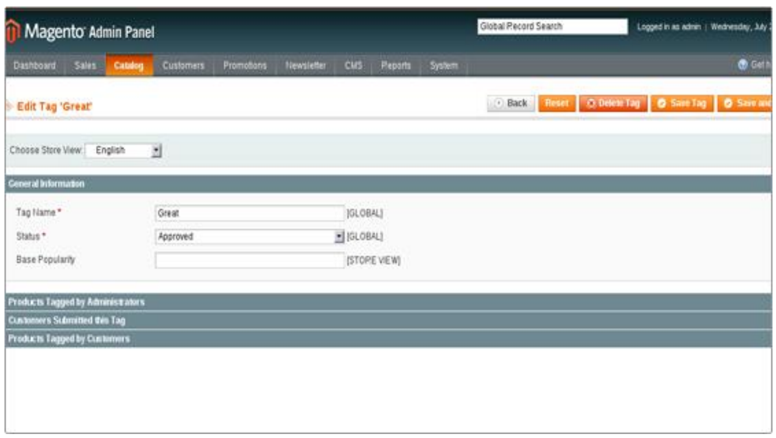
1. To **add** a tag to a product, simply write the tag word in the Add Your Tags: field available on the product page
2. Click Add Tags. We'll add "Great" as a tag. A confirmation message will show up saying that the tag has been accepted for moderation:



3. Now go to your Magento admin area **=> Catalog => Tags =>** Pending Tags to view all your pending tags. In our case, there will be only one pending tag for the word "**Great**":



4. Click it and you will be taken to a page where you can change the status of the tag. It will appear as "Pending", so let's change it to "**Approved**" and click **Save** Tag.



Now that the tag has been approved, all other customers will see it on the product page.

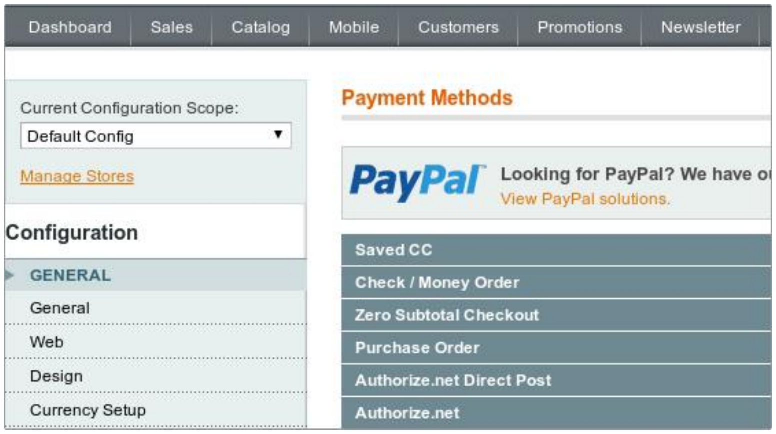
You can also manage tags on a per-product basis.

Go to your Magento admin area => Catalog => Manage Products and click the product the tags of which you want to check. Then from the left menu click Product Tags and you will see all the tags for that product.

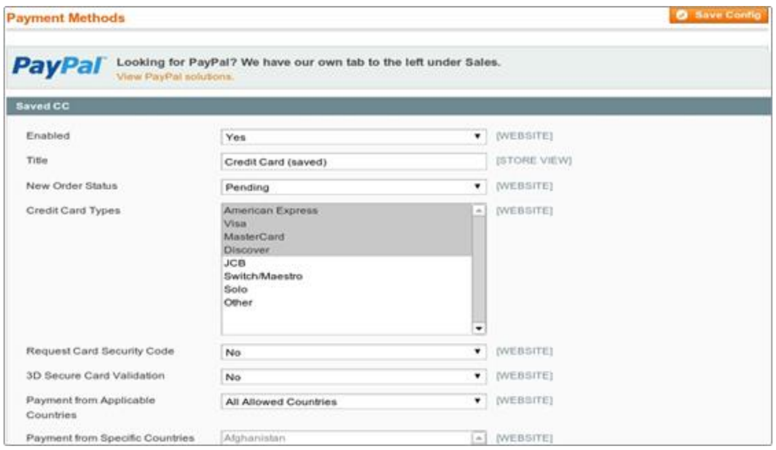
3. Configure Magento Payment Methods

Magento provides different payment methods in order to allow you to accept payments using different payment processors like Paypal, Authorize.net and many more. The clients can also pay through regular credit cards like Visa, Master Card, American Express, Discover, Switch/Solo, check/money orders and other payment solutions.

To configure you payment methods in Magento, first you need to login to your Admin area. Then, go to **System => Configuration => Sales ->Payment Methods**.



Here we will enable the credit card payment method. This method can be configured through the **Saved CC** section:

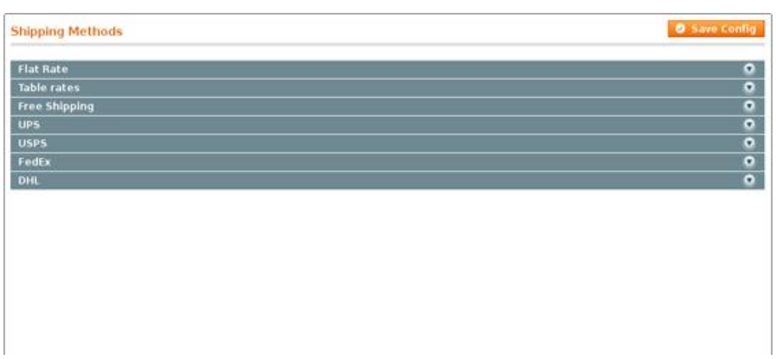


Enable the method, enter its title, set the new order status, pick the supported credit cards, decide whether the credit card verification is required, and define from which countries to accept payments and the range of the accepted payments.

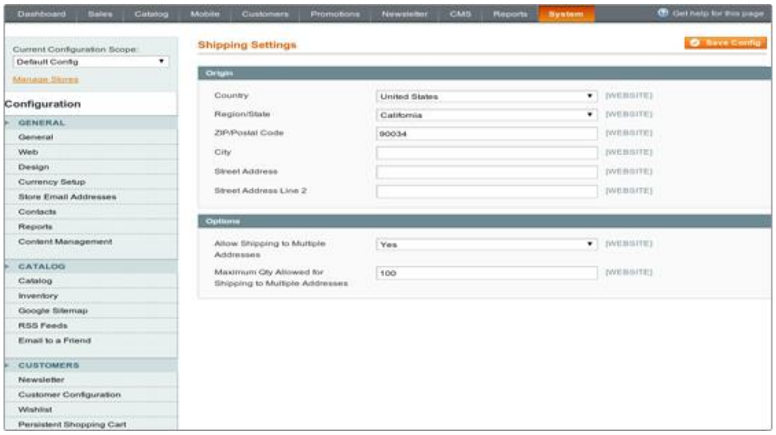
In the Sort order field you should enter the position of this payment method compared to the other payment methods offered to the customers. That's it, you have just enabled this payment method for your customers.

4. **Configure Magento Shipping Methods**

To configure your Magento Shipping methods, you need to login to your admin area and go to **System => Configuration => Sales =>Shipping Methods**.



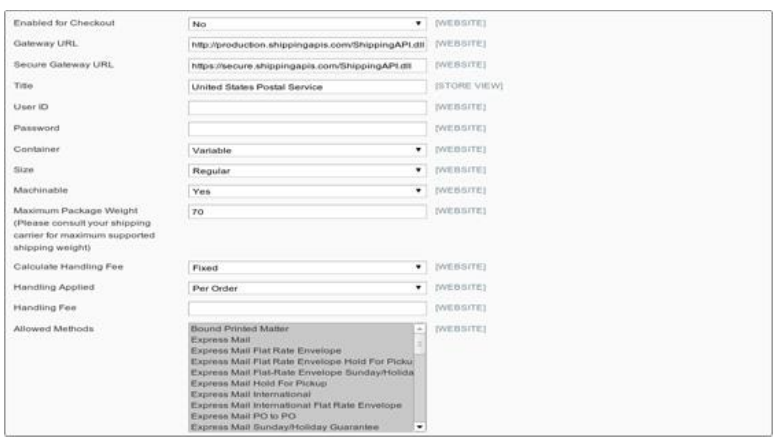
Before enabling the shipping method you should configure the shipping settings from **System => Configuration => Sales => Shipping Settings**.



Expand the **Origin** section. Enter the address from which the shipping will be initiated. Usually this is the address of the warehouse where the products are stored.

Then expand the Options section. If enabled, the option **Allow Shipping to Multiple Addresses** allows goods from a single order to be shipped to different addresses. It is useful when a customer orders many products of a single kind, like post cards or pens for example and wants them to be delivered to multiple addresses. You can define the maximum number of allowed shipping addresses in the **Maximum Qty Allowed for Shipping to Multiple Addresses** field.

For example, to enable the **USPS** shipping module, you can go to **System => Configuration => Sales => Shipping Methods** and navigate to the **USPS** section:



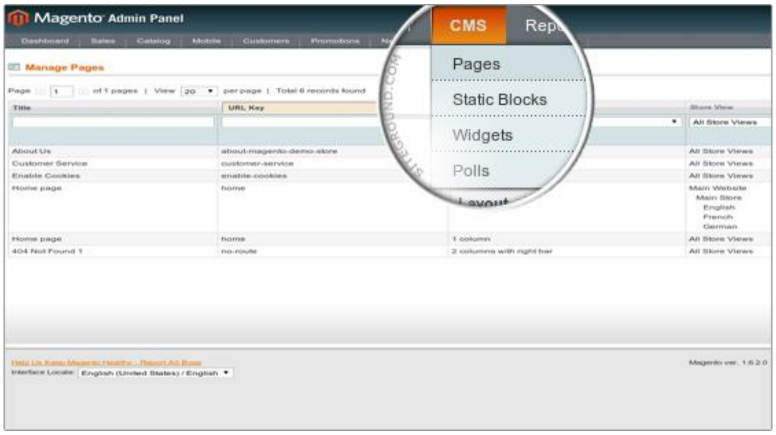
Enable the shipping method; enter the **Gateway URL** and the **UserID**. The next options allow you to describe the packages which you need to be delivered (size, weight and more).

Then you can define the handling fee. It can be fixed or calculated on the percent basis. After this you can pick the allowed delivery methods. Also, you can configure a free shipping method and define whether there is a minimum purchase sum for it.

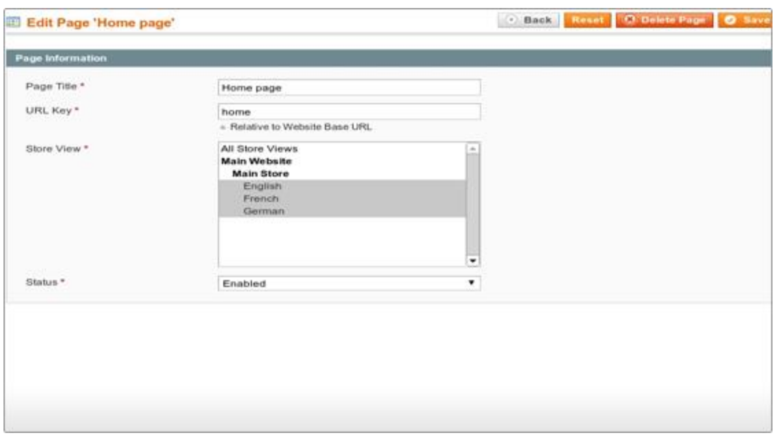
At the end you can define the countries for which the shipping is supported and the default error message in case the service is refused. In the Sort order field you should enter the position of this shipping method compared to the other shipping methods offered to the customers.

5. Creating and Managing Pages in Magneto

In order to manage your web site pages you need to navigate to the **CMS** section in the Magento admin area. Click on the **Manage Pages** link in order to proceed with the pages modification.



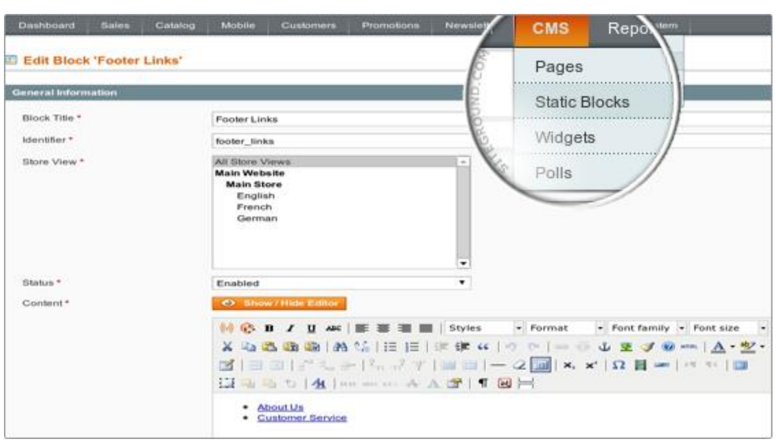
You can edit a page by clicking on it. The **Edit Page** will open the window below:



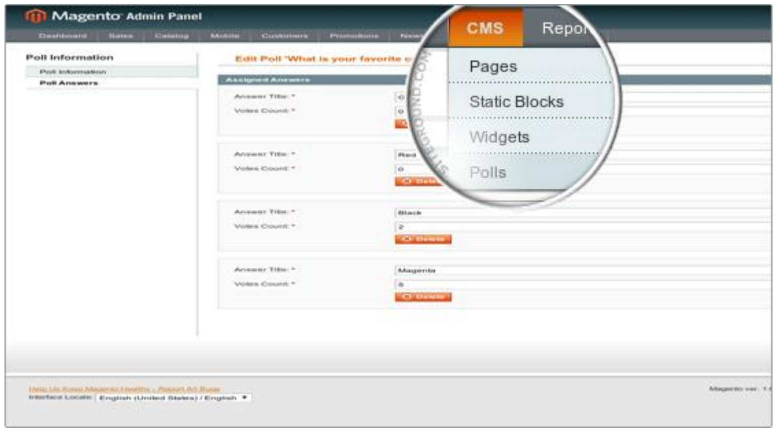
You can modify this page to your preference. **Static blocks** are another useful option. For example, you can edit the footer block which contains the links located at the bottom of your main page:

Do you know!

Magneto has a fully-featured CMS system integrated in it containing elements you can add to your site.



The **Polls** section allows you to create and edit polls:



Learner's Activity

Ecommerce Web Application Development using Drupal/Joomla/WordPress

Description: This activity consists of an interactive session in the class about developing ecommerce enabled web application using Drupal/Joomla/WordPress.

Time Guideline: 1 hour and 30 minutes

Purpose: To be able to develop web application using Drupal/Joomla/WordPress.

Presentation:

1- Divide the class into groups of five.

2- Brief the groups about the activity that each group will an ecommerce web application using Drupal/Joomla/WordPress.

3- Groups will perform this task.

4- Groups will demonstrate their work.

Learning Unit 3: Database

Overview

For all database designs, there are a set of standard rules and best practices to follow, all of which can help a database stay organized and help to team up with the respective site in a smart and efficient way. On completion of this learning unit you will be able to understand entity classes, relationships between entities, Entity relationship diagram, database keys, query designing and database tools.

Remember

Database Design is most Critical database life cycle phase. It makes sure final product meets requirements. Focus on data requirements.

1. Entity Classes

An entity class is something that can be identified and the users want to track. Entity class is a collection of entities described by the entity format in that class. Entity instance is the representation of a particular entity. There are usually many instances of an entity in an entity class.

Consider an entity class STUDENT and an entity instance would be a particular student in the entity class, for example, Sara might be an entity instance.

Do you know!

A general notational convention is to CAPITALIZE the entity class's name.

2. Database Designing

The process of producing a detailed data model of a database containing all the needed logical and physical design choices and physical storage parameters needed to generate a design of a database.

Database

A database is a collection of information that is organized so that it can easily be accessed, managed, and updated.

Phases

1. Create conceptual design

Data modeling creates abstract data structure to represent real-world items. High level of abstraction. It has four steps

i. Data analysis and requirements
ii. Entity relationship modeling and normalization
iii. Data model verification
iv. Distributed database design

DBMS

A database management system is a collection of programs that enables an organization to store, modify, and extract information from a database.

2. DBMS software selection

DBMS software selection is critical phase so advantages and disadvantages need to be studied. Factors affecting purchasing decision are Cost, DBMS features and tools, Underlying model, Portability and DBMS hardware requirements.

3. Create logical design

This phase translates conceptual design into internal model and m aps objects in model to specific DBMS constructs. Design components are Tables, Indexes, Views, Transactions and Access authorities.

4. Create physical design

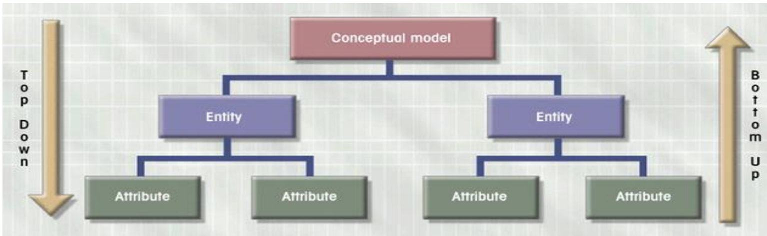
Selection of data storage and access characteristics is very technical and more important in older hierarchical and network models. It becomes more complex for distributed systems. Designers favor software that hides physical details.

There are two general design strategies exist:

1. Top-down vs. bottom-up design

Top-down

a) Identify data sets
b) Define data elements



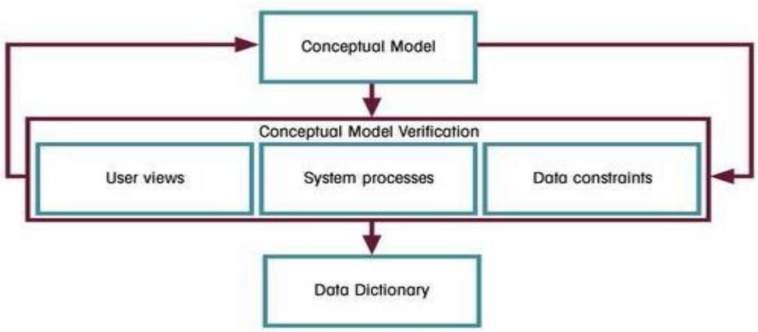
Bottom-up

a) Identify data elements
b) Group them into data sets

2. Centralized vs. Decentralized design

Centralized design

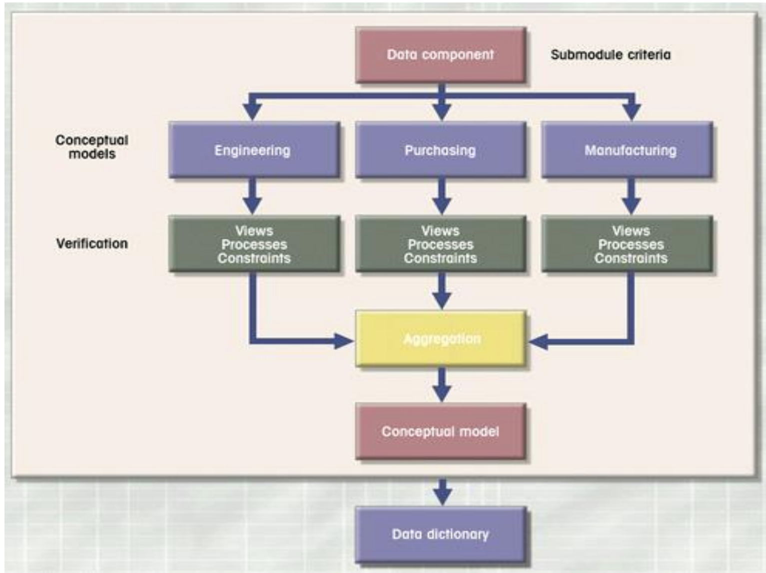
a. Typical of simple databases
b. Conducted by single person or small team



A CENTRALIZED DESIGN APPROACH

Decentralized design

a. Larger numbers of entities and complex relations
b. Spread across multiple sites
c. Developed by teams



3. Relationships

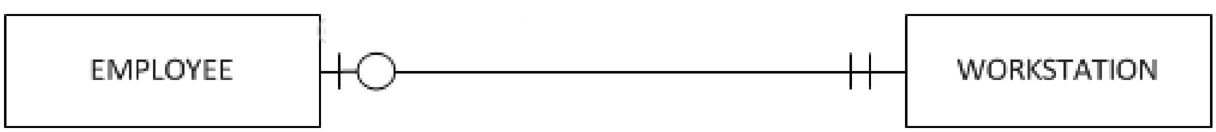
Relationship is a connection between one or more entities/tables. Relationship is handy feature of database. By using relationship you can easily retrieve data from one or more than one table.

There are three general type of relationship detailed below.

1. One-To-One Relationships

In one-to-one relationship there is one record/row for a table/entity in another table/entity is called One-To-One Relationships.

Example: An instance, an I.T. Company is constructed with many Building and Workstations. Most of the workstations are allotted to Employees and some workstations are empty that reserved for new Employees.



2. One-To-Many Relationships

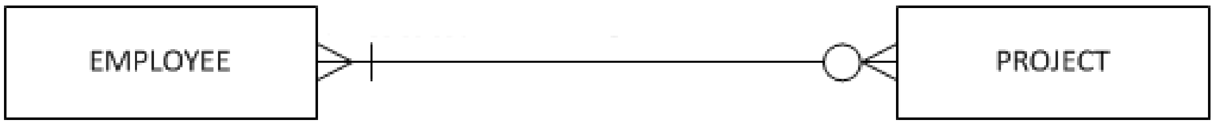
In one-to-many relationship the record/row of one table/entity there is one or more than one record in other table/entity is called One-To-Many Relationship.

Example: An instance, an I.T. Company is formed with many Technical and Non-Technical Departments. Technical Department is developed and maintaining Projects and Non-Technical Departments is maintaining Administration, HR and Marketing Activities.

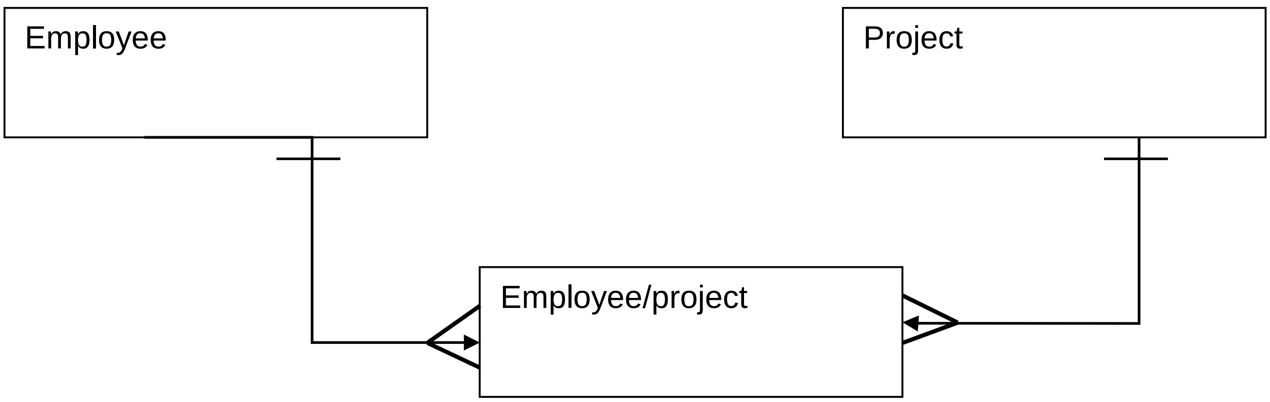
3. Many-To-Many Relationships

In many-to-many relationship the record/row of one table/entity there is one or more than one record in another table and vice versa. The many–to-many relationship can't directly create with two tables. To solve this problem you must create third table which is called junction table see example below

Example: An instance, an I.T. Company is formed with many Departments with many Employees. Each Employee is assigned in one or many Projects with many Tasks.



Many-to-Many with junction table



4. Entity Relationship Diagram

Drawing the Entity-Relationship Diagram

An entity-relationship diagram, or ERD, is a chart that visually represents the relationship between database entities to develop a system you must identify the business entities involved and their relationships. To do that, you draw an entity-relationship (E-R) diagram by following the rules and examples given below.

Rules for Drawing an E-R Diagram

1. **Definitions**

Entity: Something about which data is collected, stored and maintained. Entity can be a person, object, event etc.

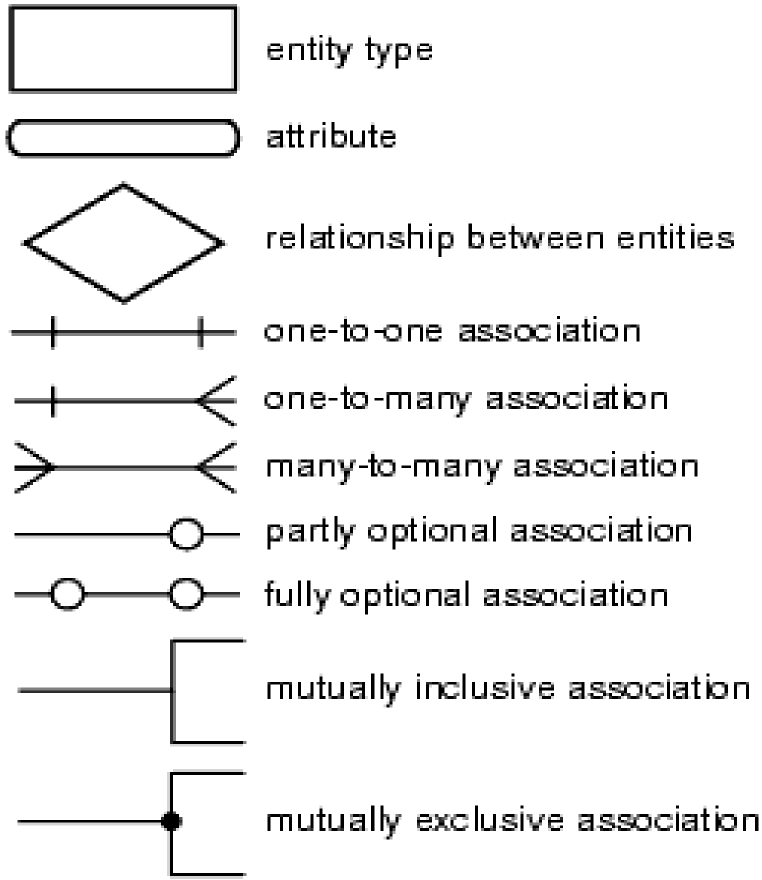
Attribute: A characteristic/property of an entity

Relationship: An association between entities.

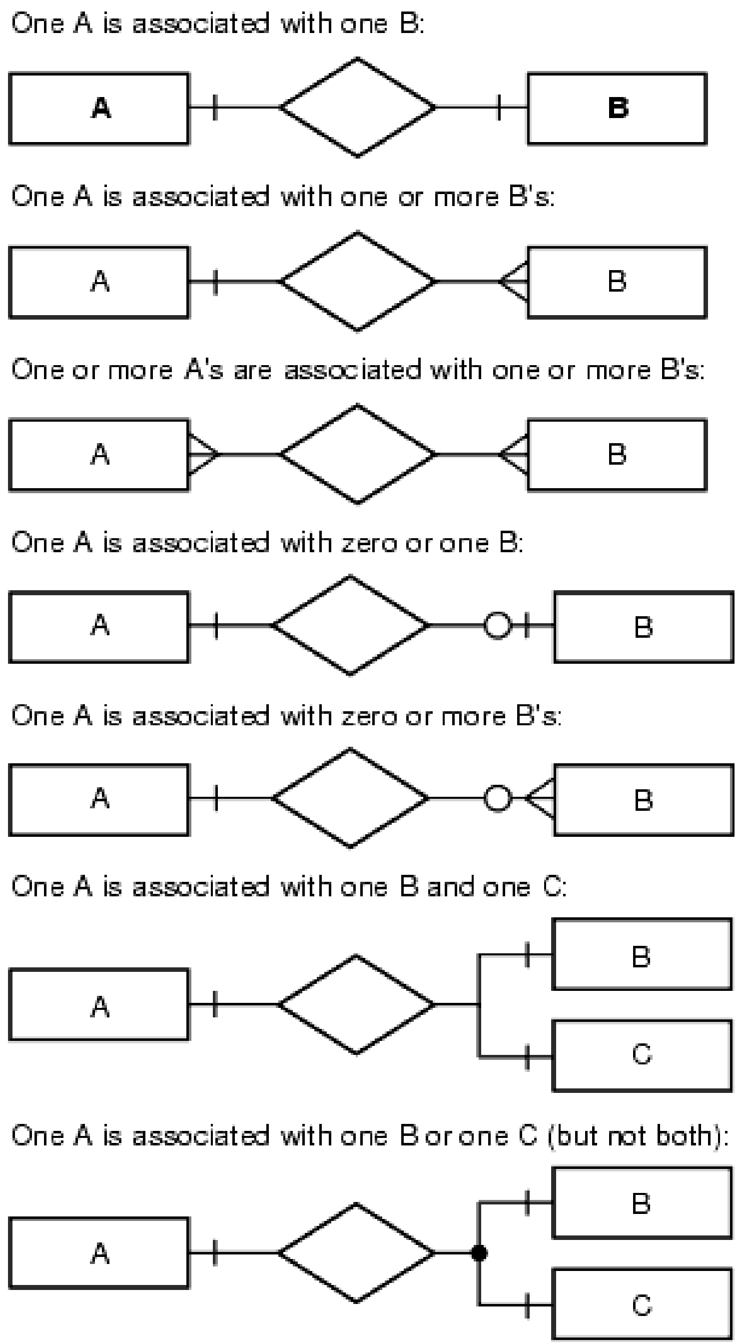
Entity Type: A class of entities that have the same set of attributes. For example in book class the books of computer science called entity type.

Record: A row/tuple in a table is called a record.

2. Symbols



3. Examples



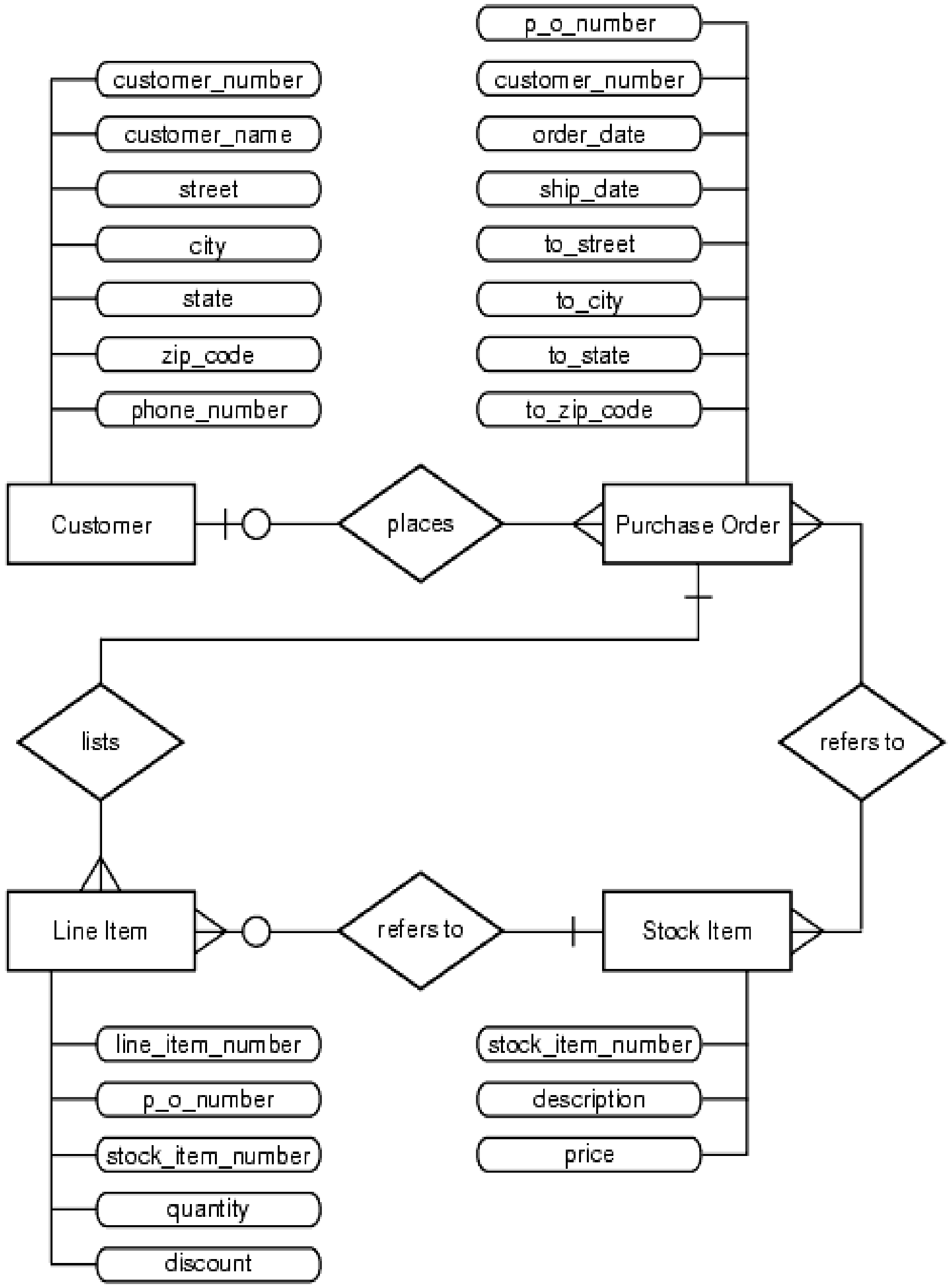
Example of an ERD Customer Purchase Orders.

A **Customer** has a one-to-many relationship with a Purchase Order because a customer can place many orders, but a given purchase order can be placed by only one customer. The relationship is optional because zero customers might place a given order (it might be placed by someone not previously defined as a customer).

A Purchase Order has a many-to-many relationship with a Stock Item because a purchase order can refer to many stock items, and a stock item can be referred to by many purchase orders. However, you do not know which purchase orders refer to which stock items.

Therefore, you introduce the notion of a Line Item. A Purchase Order has a one-to-many relationship with a Line Item because a purchase order can list many line items, but a given line item can be listed by only one purchase order.

A **LineItem** has a many-to-one relationship with a **StockItem** because a line item can refer to only one stock item, but a given stock item can be referred to by many line items. The relationship is optional because zero line items might refer to a given stock item.



5. Normalization / De-Normalization

Normalization

Remember

Normalization can actually slow performance with its frequently occurring table join operations.

Normalization is the process of removing redundant/duplicate data from tables in order to improve storage efficiency, data integrity, and scalability.

Normalization generally involves splitting existing tables into multiple ones, which must be re-joined or linked each time a query is issued.

The following are the three most common normal forms in the normalization process:

The First Normal Form

The objective of the first normal form is to divide the base data into logical units called tables. When each table has been designed, a primary key is assigned to most or all tables.

Normal Form

It is an integral concept involved in the process of database normalization. Normal form is a way of measuring the levels, or depth, to which a database has been normalized.

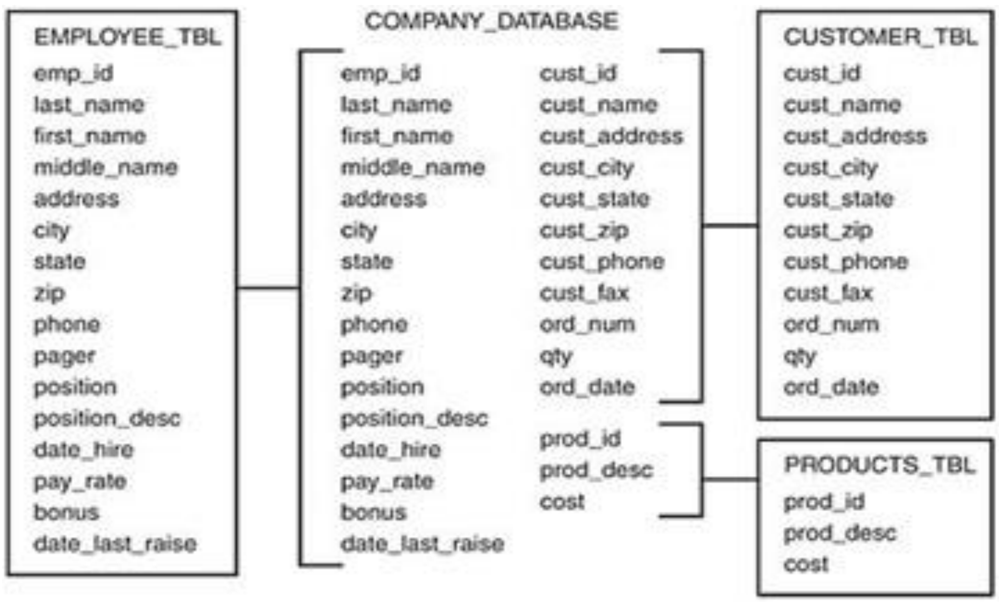


Illustration of First Normal Form

To achieve the first normal form, data had to be broken into logical units of related information, each having a **primary key** and ensuring that there are no **repeated groups** in any of the tables. Instead of one large table, there are now smaller, more manageable tables

The Second Normal Form

Do you know!

A database's level of normalization is determined by the normal form.

The objective of the second normal form is to take data that is only partially dependent on the primary key and enters that data into another table.

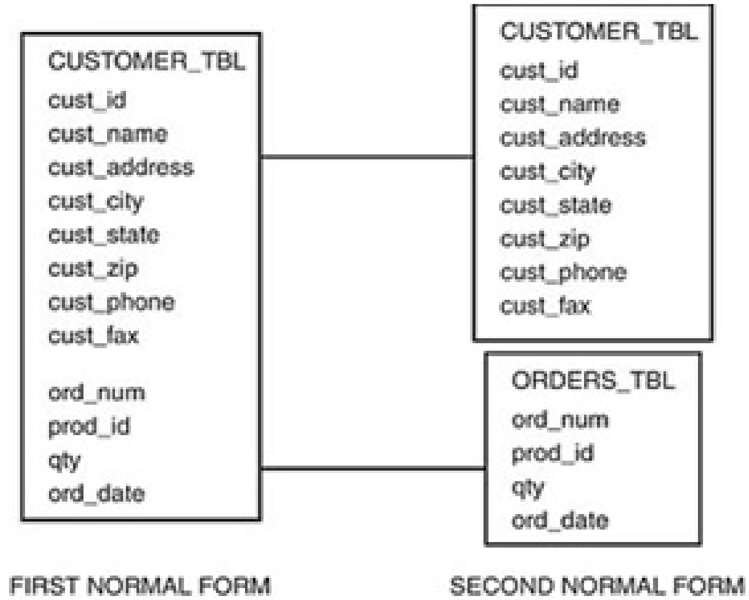
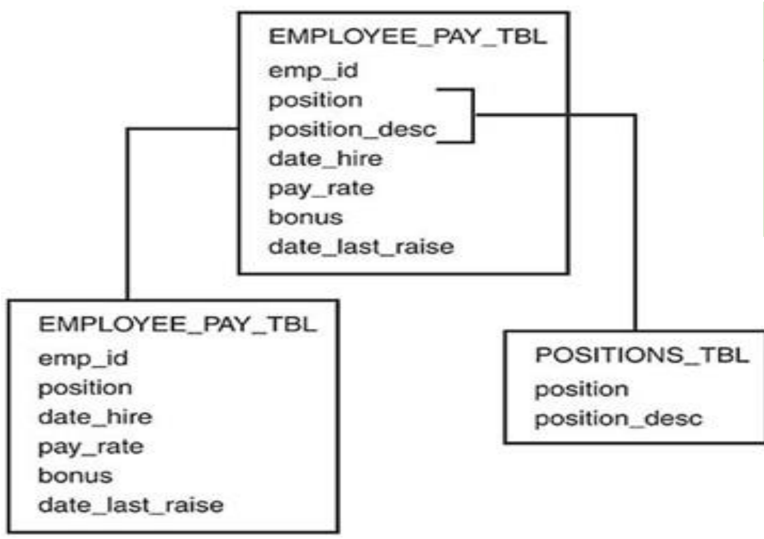


Illustration of 2nd Normal Form

According to the figure, the second normal form is derived from the first normal form by further breaking two tables down into more specific units.

The Third Normal Form

The third normal form's objective is to remove data in a table that is not dependent on complete primary key means depend on a part of the key.



Remember

A de-normalized database is not the same as a database that has not been normalized.

Illustration of 3rd Normal Form

De-normalization

De-normalization is the process of taking a normalized database and modifying table structures to allow controlled redundancy for increased database performance. Attempting to improve performance is the only reason to ever de-normalize a database. De-normalization may involve recombining separate tables or creating duplicate data within tables to reduce the number of tables that need to be joined to retrieve the requested data.

6. Keys

Keys are a key part of a relational database and a vital part of the structure of a table. They ensure each record within a table can be uniquely identified by one or a combination of fields within the table. They help enforce integrity and help identify the relationship between tables. There are three main types of keys, primary keys, foreign keys and composite key.

Primary Key

A table typically has a column or combination of columns that contain values that uniquely identify each row in the table. This column, or columns, is called the **primary key**. Primary keys must contain UNIQUE values. A primary key column cannot contain NULL values. The value of primary key can't be duplicate. Record can't be inserting without the value of primary key.

Foreign Key

A foreign key is generally a primary key from one table that appears as a field in another table where the first table has a relationship to the second.

Composite Key

A composite key consists of more than one field to uniquely identify a record.

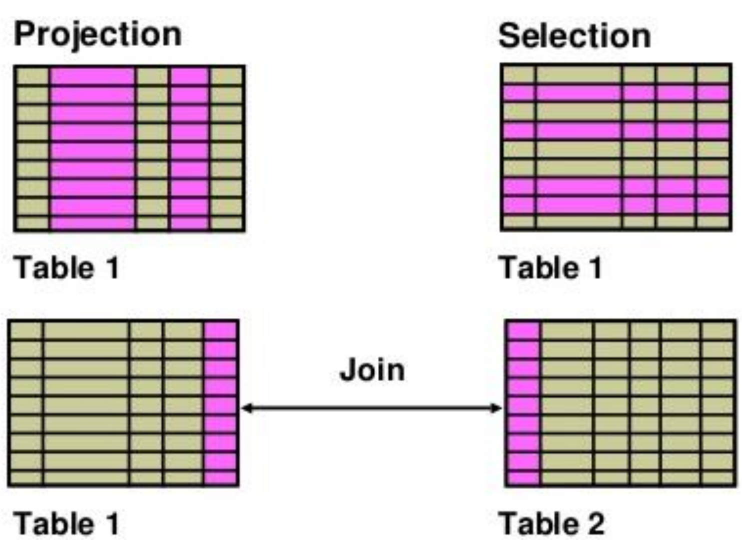
7. Query Designing

The Structured Query Language (SQL) is the set of instructions used to interact with a relational database. The most important is SELECT statement.

Capabilities of SQL SELECT Statements

Remember

SQL statements are not case sensitive. SQL statements can be on one or more lines. Keywords cannot be abbreviated or split across lines.



A **SELECT** statement retrieves information from the database. Using a SELECT statement, you can do the following:

Selection: You can use the selection capability in SQL to choose the rows in a table that you want returned by a query. You can use various criteria to selectively restrict the rows that you see.

Projection: You can use the projection capability in SQL to choose the columns in a table that you want returned by your query. You can choose as few or as many columns of the table as you require.

Join: You can use the join capability in SQL to bring together data that is stored in different tables by creating a link through a column that both the tables share.

SELECT Statement

SELECT columns
FROM table
WHERE condition
GROUP BY columns
HAVING condition
ORDER BY column [ASC | DESC]
LIMIT offset,count;

Examples of SELECT Queries

- To see all of the data:

  *SELECT * FROM kids; Vie*

- To select the "**CustomerName**" and "**City**" columns from the "Customers" table:

  SELECT CustomerName,City FROM Customers;

- Find the age, race, height and weight for any observations with weight greater than 80kg and height less than 150cm:

  SELECT age,race,height,weight FROM kids View
  WHERE weight > 80 AND height < 150;

- Find all information about the 10 tallest observations:

  *SELECT * FROM kids View*
  ORDER BY height DESC limit 1,10;

- Find all information about observations where age is from 17 to 18 and weight is from 180 to 185:

  *SELECT * FROM kids WHERE age BETWEEN 17 AND 18*
  AND weight BETWEEN 180 AND 185;

- An SQL JOIN clause is used to combine rows from two or more tables, based on a common field between them.We have a table called suppliers with two fields (supplier_id and supplier_name). It contains the following data:

SupplierId	SupplierName
10000	IBM
10001	Hewlett Packard
10002	Microsoft
10003	NVIDIA

We have another table called orders with three fields (order_id, supplier_id, and order_date). It contains the following data:

OrderId	SupplierId	OrderDate
500125	10000	2003/05/12
500126	10001	2003/05/13
500127	10004	2003/05/14

If we run the SQL statement (that contains an INNER JOIN) below:

SELECT suppliers.supplier_id, suppliers.supplier_name, orders.order_date
FROM suppliers
INNER JOIN orders
ON suppliers.supplier_id = orders.supplier_id;

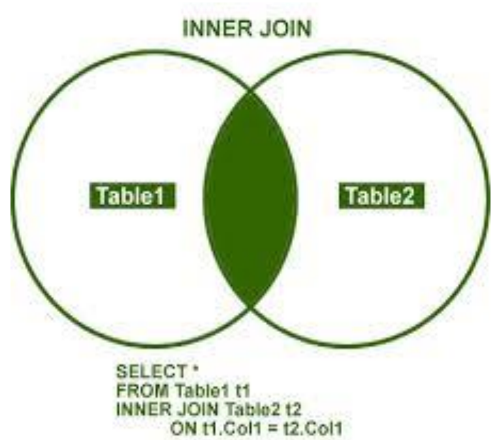
Our result set would look like this:

SupplierId	Name	OrderDate
10000	IBM	2003/05/12
10001	Hewlett Packard	2003/05/13

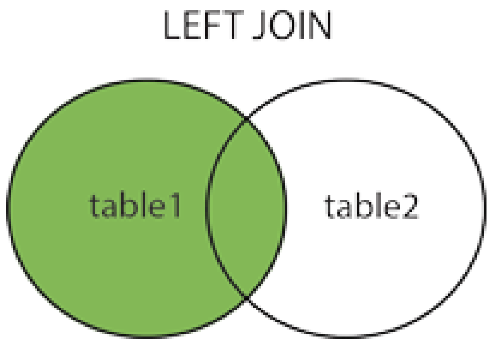
Different SQL JOINs

Before we continue with examples, we will list the types of the different SQL **JOINs** you can use:

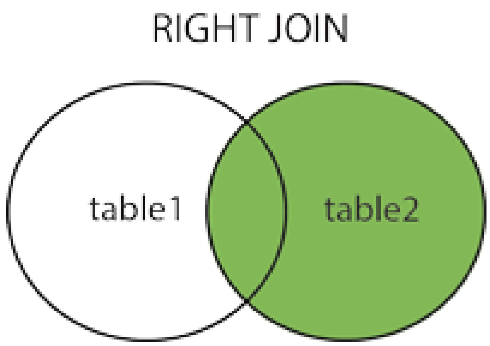
INNER JOIN: Returns all rows when there is at least one match in BOTH tables.



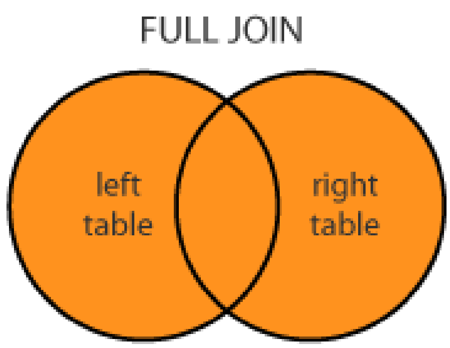
LEFT JOIN: Return all rows from the left table, and the matched rows from the right table



RIGHT JOIN: Return all rows from the right table, and the matched rows from the left table.



FULL JOIN: Return all rows when there is a match in ONE of the tables.



8. Database Design Tools

Oracle

Oracle Database (commonly referred to as Oracle **RDBMS** (relational database management system) or simply as Oracle) is an object-relational database management system produced and marketed by Oracle Corporation.

The system is built around a relational database framework in which data objects may be directly accessed by users (or an application front end) through structured query language (SQL). Oracle is fully scalable relational database architecture and is often used by global enterprises, which manage and process data across wide and local area networks. The Oracle database has its own network component to allow communications across networks.

Microsoft Access

Microsoft Access is a pseudo-relational database engine from Microsoft. It is part of the Microsoft Office suite of applications that also includes Word, Outlook and Excel, among others. Access is also available for purchase as a stand-alone product. Access uses the Jet Database Engine for data storage.

Access is used for both small and large database deployments. This is partly due to its easy-to-use graphical interface, as well as its interoperability with other applications and platforms such as Microsoft's own SQL Server database engine and Visual Basic for Applications (VBA).

MySQL

The world's second most widely used relational database management system (RDBMS) and most widely used open-source RDBMS

MySQL is very popular for Web-hosting applications because of its plethora of Web-optimized features like HTML data types, and because it's available for free. It is part of the Linux, Apache, MySQL, PHP (LAMP) architecture, a combination of platforms that is frequently used to deliver and support advanced Web applications. MySQL runs the back-end databases of some famous websites, including Wikipedia, Google and Facebook - a testament to its stability and robustness despite its decentralized, free-for-all philosophy.

Microsoft SQL Server

It is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet).

PostgreSQL

It is an open-source, object-relational database management system which supports almost all relational database features and offers a few unusual features that are normally absent in other RDBMS engines. Commonly supported objects include views, stored procedures, indexes, triggers and object-defined data types, in addition to general RDBMS features such as primary keys, foreign key relationships and atomicity. Other features are similar to Oracle DB and other database engines such features include the use of concepts like table spaces, save points and point-in-time recovery.

9. Creating a MySQL database with cPanel

The procedure of creating a MySQL database with cPanel has the following steps:

1. In order to create a MySQL database on your hosting account, you need to log in **cPanel.** This can be done by either using the Go to **cPanel** button in the Customer Area => My Accounts section or by entering one of the following URLs in your web browser:

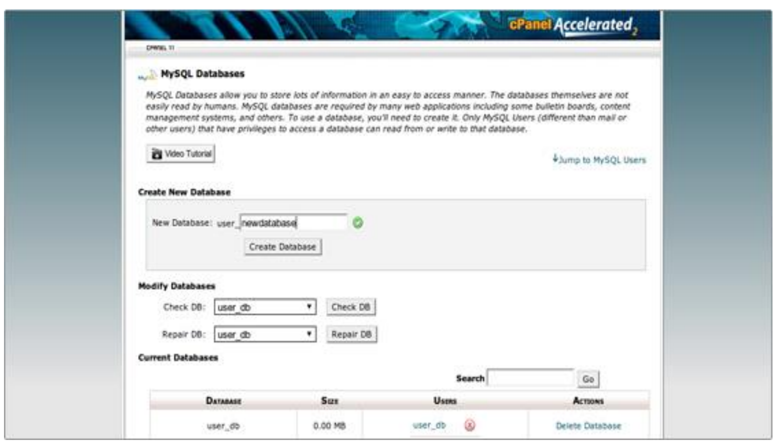
   http://yourdomainname.com/cpanel

   http://cpanel.servername.com

Remember

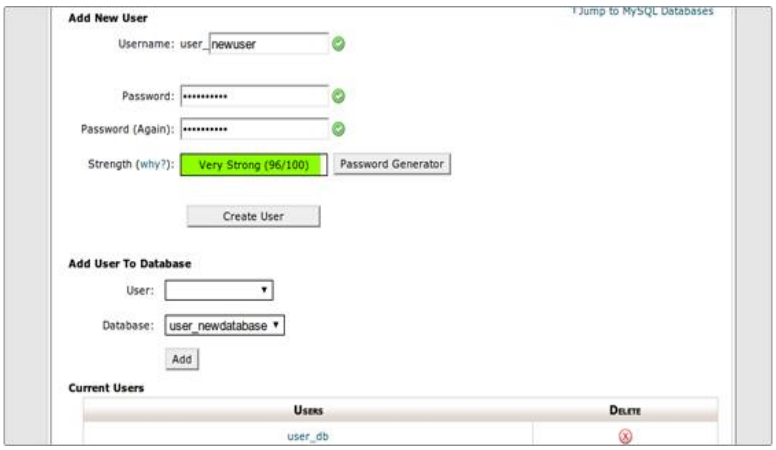
XAMP installation is required to create database in MySQL at local computer.

2. In order to create a new database you need to enter the desired name for the database in the New Database field and click on the Create Database button as shown below:

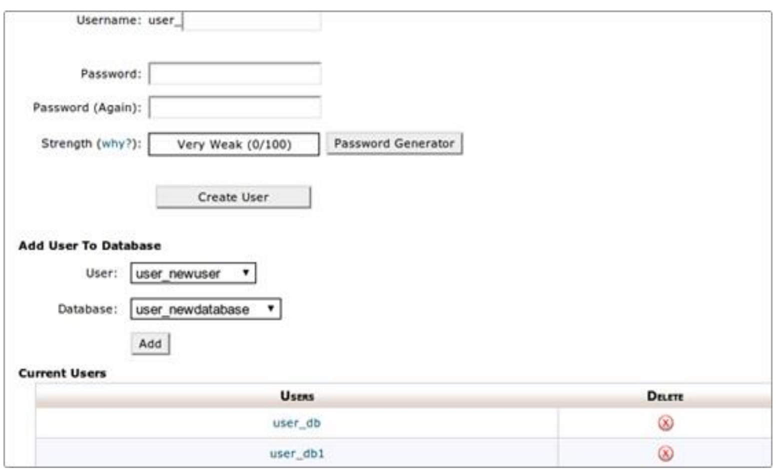


A confirmation screen will be displayed, informing that the database has been successfully created:

3. You can click on the Go Back button to return to the database management screen. Enter the username.



Click Submit to save your MySQL username.



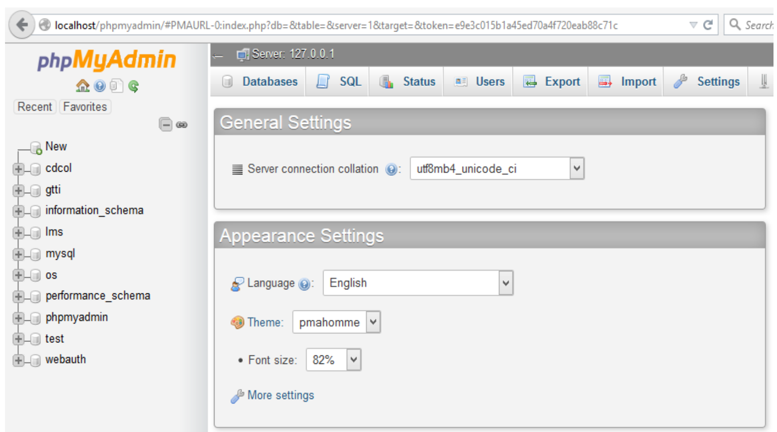
4. You will be redirected to a screen where you will be prompted to choose the desired privileges. It is advisable to select All Privileges and click on the Make Changes button:

that's all you have successfully created a database!

10. Creating a MySQL database with PhpMyAdmin

The procedure of creating a MySQL database with PhpMyAdmin has the following steps:

1. Start MySQL from XAMP interface.



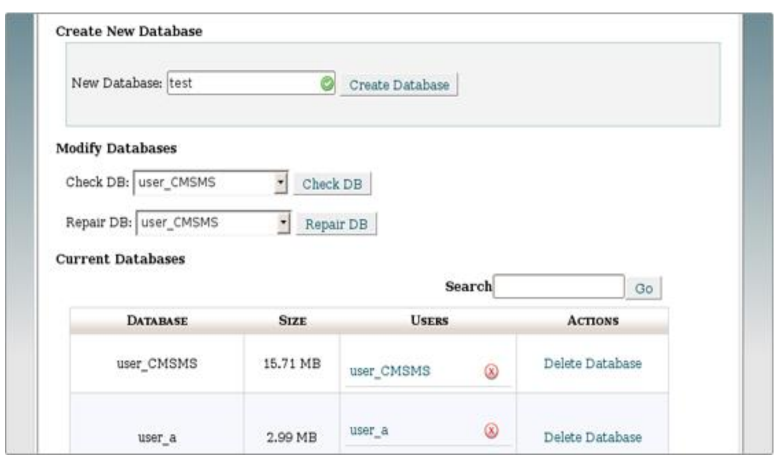
Remember

XAMP installation is required to create database in MySQL at local computer.

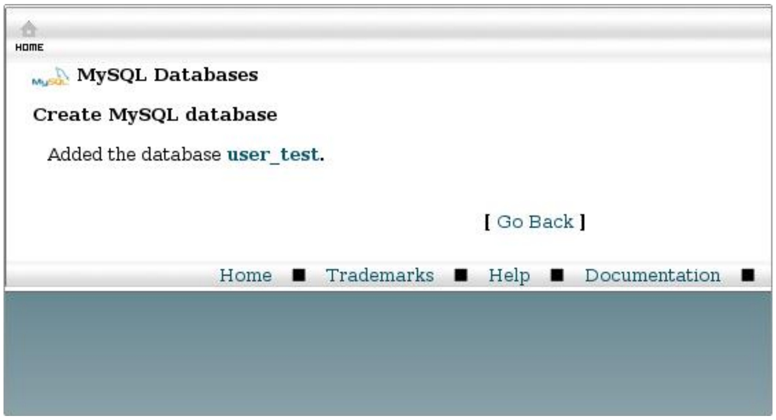
PHPMyAdmin

PHPMyAdmin is a free software tool written in PHP, intended to handle the administration of MySQL over the Web.

2. Following screen will open. Give name to your database and then click create database.



3. On next screen you will see a confirmation message that database has been created.



Learner's Activity

Draw an ER Diagram

Description: This activity consists of an interactive session in the class about Draw an ER diagram for the following situations.

A company has a number of employees. Each employee may be assigned to one or more projects, or may not be assigned to a project. A project must have at least one employee assigned, and may have several employees assigned.

Time Guideline: 30 Minutes

Purpose: To be able to draw an ER diagram for different situations.

Presentation:

1- Divide the class into groups of two.

2- Brief the groups about the activity that each group will draw an ER Diagram for above mentioned situation.

3- Groups will perform this task.

4- Groups will demonstrate their work.

Learning Unit 4: Security (HTTPS)

Overview

HTTPS is a protocol for secure communication over a computer network. The main motivation for HTTPS is authentication of the visited website and to protect the privacy and integrity of the exchanged data. On completion of this learning unit, you will be able to understand secure socket layer, implementation of web services for SET, Public key encryption, firewall integration, deploying security Linux and usage of anti-hacking tools.

1. Secure Socket Layer

SSL is the standard for encrypted and authenticated communications between clients and servers on the Internet. Virtually all online purchases and browser-based financial transactions that occur on the Internet are secured by SSL.

However, SSL is not just limited to securing e-commerce transactions; the following are a few other examples of SSL use:

1. Financial institutions implement SSL to secure the transmission of PIN numbers and other confidential account information.

2. Insurance companies implement SSL to secure transmission of confidential policy information.

3. Organizations who have established Business-to-Business (B2B) extranets implement SSL to secure transactions between the company and its partners, suppliers, and customers.

4. Private organizations implement SSL in their intranets to confidentially transfer information to and from employees.

5. Email providers implement SSL to secure webmail for users.

2. Secure Electronic Transfer

Do you know!

SET was developed by the SET Consortium, established in 1996 by VISA and MasterCard

Secure Electronic Transaction (SET) was a communications protocol standard for securing credit card transactions over insecure networks, specifically, the Internet. SET was not itself a payment system, but rather a set of security protocols and formats that enabled users to employ the existing credit card payment infrastructure on an open network in a secure fashion.

To meet the business requirements, SET incorporates the following features:

1. Confidentiality of information

2. Integrity of data

3. Cardholder account authentication

4. Merchant authentication

A SET system includes the following components:

1. Merchant
2. Cardholder/acquirer
3. Card issuer
4. Payment gateway
5. Certification authority (CA)
6. Dual signature: A guaranteed SET data integrity innovation that links two different recipient messages

3. Implementation of Cryptology Standards

Public Key Encryption

Public key cryptography is a cryptographic technique that enables users to securely communicate on an insecure public network, and reliably verify the identity of a user via digital signatures.

A public key infrastructure (**PKI**) is a system for the creation, storage, and distribution of digital certificates which are used to verify that a particular public key belongs to a certain entity. The PKI creates digital certificates which map public keys to entities, securely stores these certificates in a central repository and revokes them if needed.

A PKI consists of:

1. A certificate authority (CA) that both issues and verifies the digital certificates
2. A registration authority which verifies the identity of users requesting information from the CA
3. A central directory—i.e., a secure location in which to store and index keys
4. A certificate management system.
5. A certificate policy

Advanced Encryption Standards

The Advanced Encryption Standard (AES) is a symmetric-key block cipher algorithm and U.S. government standard for secure and classified data encryption and decryption. The AES has following features:

1. Block encryption implementation
2. 128-bit group encryption with 128, 192 and 256-bit key lengths
3. Symmetric algorithm requiring only one encryption and decryption key
4. Data security for 20-30 years
5. Worldwide access
6. No royalties
7. Easy overall implementation

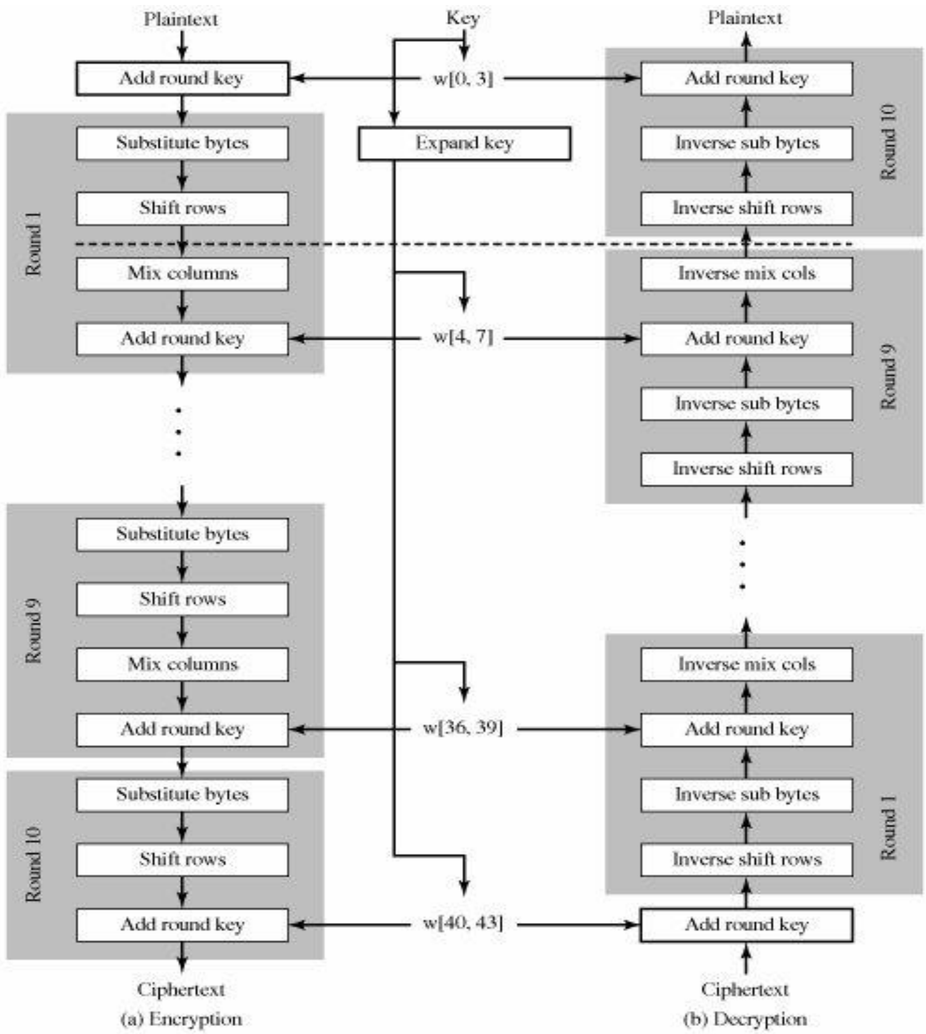


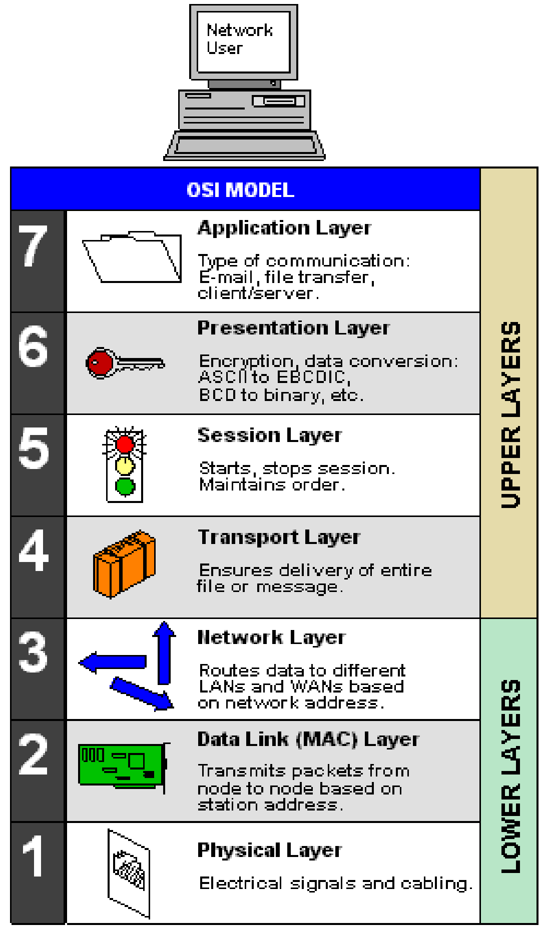
Illustration of AES Encryption and Decryption

Blowfish Cipher

A symmetric encryption algorithm designed by Bruce Schneier in 1993 as an alternative to existing encryption algorithms, such as DES. Blowfish is a 64-bit block cipher (i.e., a cryptographic key and algorithm are applied to a block of data rather than single bits) that uses a key length that can vary between 32 and 448 bits. Blowfish is available for free use by any, and the technology is unpatented and free of license.

4. Integrate Firewalls Configuration

Packet Filtering

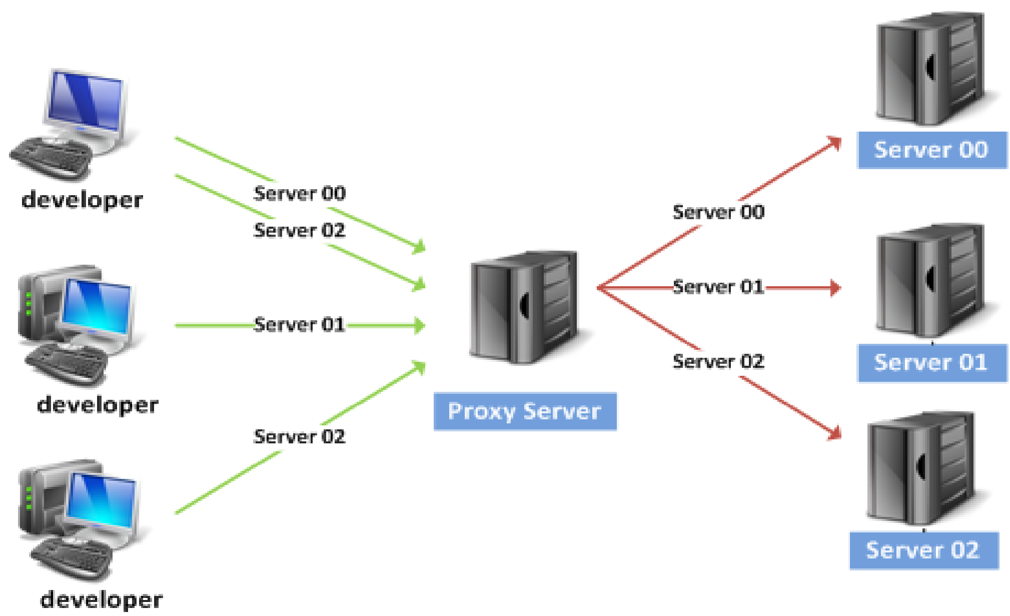


Packet filtering firewalls work mainly on the first three layers of the OSI reference model, which means most of the work is done between the network and physical layers, with a little bit of peeking into the transport layer to figure out source and destination port numbers. When a packet originates from the sender and filters through a firewall, the device checks for matches to any of the packet filtering rules that are configured in the firewall and drops or rejects the packet accordingly. When the packet passes through the firewall, it filters the packet on a protocol/port number basis.

Packet filtering is the process of passing or blocking packets at a network interface based on source and destination addresses, ports, or protocols. The process is used in conjunction with packet mangling and Network Address Translation (**NAT**).

Proxy Servers

A proxy server is an application server which forms part of a firewall. It checks the validity and acceptability of IP (internet protocol) messages directed by a public Internet user to a server behind the firewall. Only ‘allowed’ messages are relayed by the proxy to the ‘real’ application server. A proxy server used to check the acceptability of incoming electronic mail content. In effect this is a virus scanner.



5. Deploy Security-Enhanced Linux

Security-Enhanced Linux

Remember

SELinux is not

- A replacement for passwords/firewalls/other security systems.
- Antivirus software.
- An all-in-one security solution.

SELinux is an implementation of a mandatory access control mechanism in the Linux kernel, checking for allowed operations after standard discretionary access controls are checked. It can enforce rules on files and processes in a Linux system, and on their actions, based on defined policies.

SELinux Benefits

1. All processes and files are labeled with a *type*. A *type* defines a *domain* for processes, and a *label* for files.

2. Running in their own domains separates processes from each other, and **SELinux** policy rules define how processes interact with files, as well as how processes interact with each other.

3. Access is only allowed if a **SELinux** policy rule exists that specifically allows it.

4. **SELinux** implements fine-grained access control.

5. **SELinux** policy is not set at user discretion but rather is administratively-defined and enforced system-wide.

Do you know!

SELinux was created by the National Security Agency.

SELinux Forms of Access Control

SELinux has four forms of access control:

1. Targeted Enforcement (TE)

2. Strict

3. Role-Based Access Control (RBAC) and

4. Multi-Level Security (MLS)

SELinux Modes

SELinux has three modes of operation:

1. Disabled - SELinux enforcement entirely turned off and also the creation of proper labels on the files no longer takes place.

2. Permissive - The kernel will also continue to create properly labeled files, watch all system access checks, and report Access Violations in the form of Access Vector Cache (AVC) messages but will allow the access.

3. Enforcing - This tells the system to run with SELinux labeling files with proper contexts, watching all system access checks, stopping all "Denied" access, and logging all AVC violations.

Setting Up SELinux

1. How do you go about enabling SELinux? If this is a fresh install, you'll be presented with an option to enable it on the first boot after installation and "Bob's your uncle."

2. More than likely, the system you wish to bring SELinux up on has been running for some time. The first step is to determine the state of SELinux on the system.

3. Edit the file /etc/selinux/config. Change the lines to look like this:

   SELINUX=permissive

   SELINUXTYPE=targeted

4. You could go for whole enchilada and go straight from disabled mode to enforcing mode. I do not recommend this unless you enjoy hordes of enraged users darkening your doorway.

5. If the system has been running in disabled mode, newly created file system objects will not be labeled with a security context.

6. To set the file systems to be relabeled on reboot, do *touch /.autorelabel*

7. Now please reboot your computer.

6. Anti-hacking Tools

Intrusion Detection

An intrusion detection system (IDS) is a device or software application that monitors network or system activities for malicious activities or policy violations and produces reports to a management station. IDS come in a variety of “flavors” and approach the goal of detecting suspicious traffic in different ways

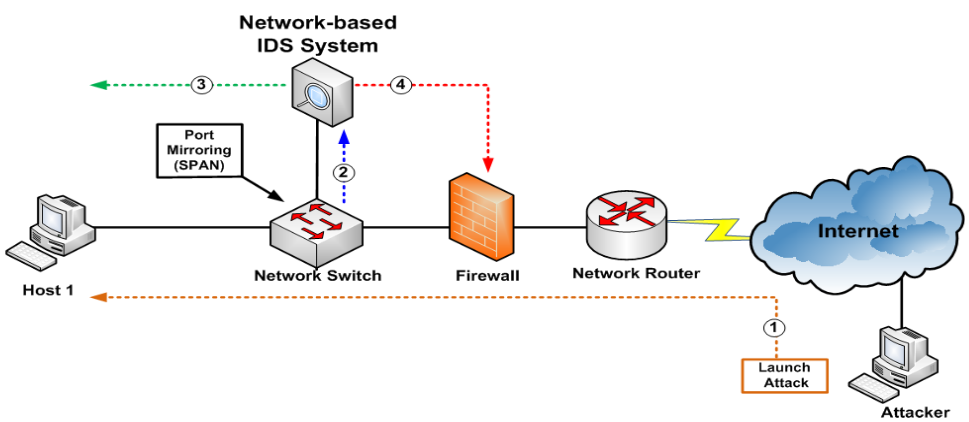


Illustration of Hardware Based Intrusion Detection System

The following intrusion detections are commonly used

1. Network based intrusion detection systems (NIDS)

2. Host based intrusion detection systems (HIDS).

Intrusion detection and prevention systems (**IDPS**) are primarily focused on identifying possible incidents, logging information about them, and reporting attempts. Organizations use **IDPSes** for other purposes, such as identifying problems with security policies, documenting existing threats and deterring individuals from violating security policies.

Denial Of Service

A denial-of-service attack is an attempt to make a machine or network resource unavailable to its intended users. This could be CPU resources, but often involves efforts to temporarily or indefinitely interrupt or suspend services of a host connected to the Internet. Defensive responses to denial-of-service attacks typically involve the use of a combination of attack detection, traffic classification and response tools, aiming to block traffic that they identify

Blackholing and Sinkholing

In **blackholing**, all the traffic to the attacked DNS or IP address is sent to a "black hole".
In **Sinkholing** routes traffic to a valid IP address which analyzes traffic and rejects bad packets.

as illegitimate and allow traffic that they identify as legitimate. Tools include firewalls, Intrusion-prevention systems, DoS Defense System and Blackholing and Sinkholing etc.

Worms Attack

Worms spread by exploiting vulnerabilities in operating systems. Vendors with security problems supply regular security updates and if these are installed to a machine then the majority of worms are unable to spread to it. If vulnerability is disclosed before the security patch released by the vendor, a zero-day attack is possible.

Users need to be suspicious of opening unexpected email and should not run attached files or programs, or visit web sites that are linked to such emails. However, as with the ILOVEYOU worm, and with the increased growth and efficiency of phishing attacks, it remains possible to trick the end-user into running malicious code.

Anti-virus and anti-spyware software are helpful, but must be kept up-to-date with new pattern files at least every few days. The use of a firewall is also recommended.

7. Shortcomings of Internet Protocols

User Datagram Protocol

1. There are no guarantees with UDP. A packet may not be delivered, or delivered twice, or delivered out of order; you get no indication of this unless the listening program at the other end decides to say something. TCP is really working in the same environment; you get roughly the same services from IP and UDP.

2. UDP has no flow control. Implementation is the duty of user programs.

3. Routers are quite careless with UDP. They never retransmit it if it collides, and it seems to be the first thing dropped when a router is short on memory. UDP suffers from worse packet loss than TCP.

Transmission Control Protocol

1. The operating system may be buggy, and you can't escape it. It may be inefficient, and you have to put up with it. It may be optimized for conditions other than the ones you are facing, and you may not be able to retune it.

2. TCP makes it very difficult to try harder you can set a few socket options, but beyond that you have to tolerate the built in flow control.

3. TCP may have lots of features you don't need. It may waste bandwidth, time, or effort on ensuring things that are irrelevant to the task at hand.

4. TCP has no block boundaries you must create your own.

5. Routers on the internet today are out of memory. They can't pay much attention to TCP flying by, and try to help it. Design assumptions of TCP break down in this environment.

6. TCP has relatively poor throughput on a loss, high bandwidth, and high latency link, such as a satellite connection or an overfull t1.

7. TCP cannot be used for broadcast or multicast transmission.

8. TCP cannot conclude a transmission without all data in motion being explicitly hacked.

Learning Unit 5: Payment Modes

Overview

Setting up payment mode is an important step for development of ecommerce enabled web applications. After completing of this learning unit, you will able to understand renowned payment modes like credit card/ debit card, Integration with VeriSign , working of different financial networks like Union, Pay, Visa, MasterCard, Orix, Leasing,1-Link, MNet, Phoenix and integration of internationally recognized payment protocols like ACH & PayPal.

Remember

Never share your debit cards PIN with anyone.

1. Payment Modes

Credit Card

Credit card is plastic smart card issued by a bank to customer with a defined credit limit that the customer can use to purchase goods and services. Customer is also allowed a defined number of days to pay the amount back to the bank and after that a fixed interest is charged. There are 7 major credit card issuing authorities worldwide -Master cards, Visa Cards, American Express cards, Diner's Club cards, Discovery cards, JCB cards, Delta cards.

Do you know!

The concept of using a card for purchases was described in 1887 by Edward Bellamy in his utopian novel Looking Backward.

How Credit Card Works

1. The customer wants to make the purchase. He/she can use a credit card to pay for the item in the store, through an online payment gateway, by phone or by mail.
2. The credit card is swiped through a secure credit card terminal, or the card and transaction information is entered in. For e-commerce transactions, the cardholder keys in the payment option.
3. The credit card data is transmitted for approval as the terminal, POS system or secure payment gateway is connected to the processing network.
4. Once the data is transmitted, the credit card issuer can approve or decline the transaction. This is based on the validity of the card, the transaction, as well as the cardholder’s available funds.
5. If the transaction is approved, the processor and the merchant receive an authorization response.
6. The merchant completes the transaction.
7. The merchant completes the credit card payment process at the end of the day with a batch closure. This closes out the transactions that have been processed on that day. The processor’s acquiring bank then collects the funds from the credit card issuers.
8. The processor’s acquiring bank then deposits the funds into the merchant’s business account. This typically takes up to 48 hours.
9. When bank made payment to merchant on behalf of customer (credit card user) then customer will have to pay this respective credit card payment to respective bank within specific period. Period vary on bank to bank basis. In case of failure of payment on time the customer is levied with surcharge/interest by bank.

Debit Card

Debit card is again a plastic smart card which is directly linked to card holder's bank account. This card acts like a cheque with the money withdrawn from the existing account balance. Maestro & Visa Electron are 2 major service providers that power the debit card and help banks to offer banking services through debit card internationally.

Types of Debit Cards

1. PIN-only cards
2. Dual-use cards

3. Electronic Benefits Transfer cards
4. Prepaid cards

Here's how they work.

Debit cards give you a fast, easy and secure way to make a purchase or withdraw cash. When you use your debit card to buy something or withdraw money from an ATM, the transaction usually takes three important

1. The transaction is forwarded through what is called a payment processor.
2. The processor routes the transaction to an ATM/debit network.
3. The network then sends the transaction to your bank or credit union. Your financial institution verifies the availability of funds and then approves or declines the transaction.

2. Web Service Integration with VeriSign

Remember

Having a merchant account or payment gateway to process and protect online credit card payments is essential to any online business.

When shopping online, your customers want to know that they are safe. They want to know that the transactions they make with your Web site are secure, and that they are not likely to have information stolen by a third party. One of the most trusted names in payment gateway security is VeriSign. VeriSign helps protect payment gateways through encryption. It is true that VeriSign used to have its own payment gateway, but it was acquired by PayPal. But, even though VeriSign no longer offers a payment gateway, it does help keep all sorts of Web site payment gateways secure.

VeriSign security certificates

VeriSign uses an encryption method call Secure Socket Layer (SSL) to encode messages. When you enter your information for a transaction, it is scrambled so that third parties who might intercept it can't read it. The seller's Web site has the proper key to decode the message and get the information. SSL encryption is also used by payment gateways to encode it when it is being sent to banks for authorization.

You usually have to pay for your own security certificate. However, in some cases it is possible to sign on to the certificate offered by your ecommerce Web host. This is usually cheaper, but it means that you cannot take the certificate with you when you change Web hosts. If you want your own validation, you will have to pay more for your own certificate. Verisign offers various solutions for website and server security.

In any case, it is important to have some sort of a security certificate for your business Web site. Most online shoppers will check to see if you are adequately protected. The VeriSign name is one that can be trusted, and customers will have peace of mind when they shop on your site if you have validation prominently displayed. However, it is up to you to do your research and decide what level of security and validation you want, as well as whether you want your own certificate or whether you share with your ecommerce Web host.

Do you know!

In 2010, VeriSign sold its authentication business unit which included SSL certificate, PKI, VeriSign Trust Seal, and VeriSign Identity Protection services to Symantec for $1.28 billion.

3. Working of Financial Networks

Union Pay

UnionPay is a domestic bank card organization. It is also the interbank network linking the ATMs of all banks throughout mainland China and widely accepted by the ATMs in Hong Kong and Macau. It is also an EFTPOS (Electronic Funds Transfer at Point of Sale) network.

Visa

Visa Inc. is an American multinational financial services corporation. It facilitates electronic funds transfers throughout the world, most commonly through Visa-branded credit cards and debit cards. Visa does not issue cards, extend credit or set rates and fees for consumers; rather, Visa provides financial institutions with Visa-branded payment products that they then use to offer credit, debit, prepaid and cash-access programs to their customers.

MasterCard

MasterCard Incorporated is an American multinational financial services corporation. Throughout the world, its principal business is to process payments between the banks of merchants and the card issuing banks or credit unions of the purchasers who use the "MasterCard" brand debit and credit cards to make purchases.

OrixCorporation

Orix Corporation is a financial services group. Orix offers leasing, lending, rentals, life insurance, real estate financing and development, venture capital, investment and retail banking, commodities funds and securities brokering.

1-Link

1LINK (Guarantee) Limited is a consortium of major banks that own and operate the largest representative interbank network in Pakistan. The 1LINK brand has grown as their number of member banks increases.1LINK (Guarantee) Limited is a registered company, incorporated under the company law by Security and Exchange Commission of Pakistan (SECP).

MNet

MNET Services Private Limited is a Pakistani operator of inter-bank connectivity platform for online financial transaction processing and offers a managed services portfolio that includes card personalization & management, mobile payment services and ATM & POS controller hosting.

4. Payment Protocol

Automated Clearing House

Automated Clearing House (**ACH**) is an electronic network for financial transactions in the United States. ACH processes large volumes of credit and debit transactions in batches. ACH credit transfers include direct deposit, payroll and vendor payments. ACH direct debit transfers include consumer payments on insurance premiums, mortgage loans, and other kinds of bills. Businesses increasingly use ACH online to have customers pay, rather than via credit or debit cards.

Benefits of ACH Payments

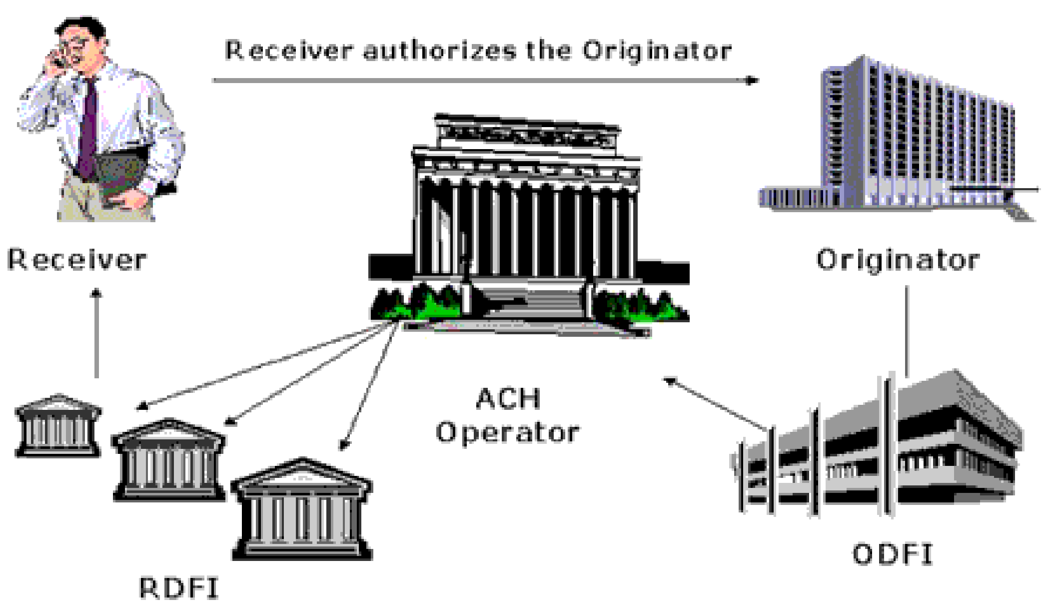
Following are the benefits of ACH Payments

1. Provide your customers with an alternative to credit cards and checks.
2. Offer lower-cost payment than either checks or credit cards.
3. Faster payments than using checks.

How the ACH Network and ACH Payments Work

NACHA includes Members in the process of establishing Rules for the ACH Network, working collaboratively to create a clear picture of participant roles and responsibilities in the following ACH transaction process.

How the ACH Network and ACH Payments Work



1. An Originator (individual/corporation/another entity) initiates either a Direct Deposit or Direct Payment transaction using the ACH Network.

2. Instead of using paper checks, ACH entries are entered and transmitted electronically, making transactions quicker, safer and easier.

3. The Originating Depository Financial institution (ODFI) enters the ACH entry at the request of the Originator.

4. The ODFI aggregates payments from customers and transmits them in batches at regular, predetermined intervals to an ACH Operator.

5. ACH Operators (two central clearing facilities: The Federal Reserve or The Clearing House) receive batches of ACH entries from the ODFI.

6. The ACH transactions are sorted and made available by the ACH Operator to the Receiving Depository Financial Institution (RDFI).

7. The Receiver's account is debited or credited by the RDFI, according to the type of ACH entry. Individuals, businesses and other entities can all be Receivers.

8. Each ACH credit transaction settles in one to two business days, and each debit transaction settles in just one business day, as per the Rules.

PayPal

PayPal is an option that can be used to take financial transactions over the Web. PayPal allows for secure payments plus accepts credit cards, debit cards, and bank account payments for a fee.

Integration of PayPal into website

It's easy to start accepting payments online by integrating PayPal into your website.

1. Open a PayPal Business account.
2. Log in and create a Website Payments button from the Merchant Services tab
3. Start accepting online payments by pasting the customized HTML button code onto your website.

Summary of Module

- Fundamental coding standards, coding terminologies and coding techniques are followed for improving the quality of source code. They are hallmarks of a professional web developer.

- Unit testing takes the smallest piece of testable software and determine whether it behaves exactly as you expect. OOP has many benefits like ease of maintenance, reuse of code etc.

- Frameworks are used to develop software applications. Spring MVC, JSF, Struts, Codelgenator, zend and entity framework are examples of open source frameworks.

- Entity Relationship Diagram is a graphical representation of entities and their relationships. Normalization is a process of reducing redundancies of data in a database. Denormalization is the process of attempting to optimize the read performance of a database by adding redundant data or by grouping data.

- Queries are used to retrieve information from a database. Oracle, MS Access, My SQL, MS SQL and Postgress are different tools to design databases.

- Security is achieved using secure Socket Layer a server side security technique, implementing web services for SET, designing public Key encryption, integrating firewall and using Anti-hacking tools

- Credit Card and Debit card are renowned payment modes. Verisign is used to integrate web services. Union Pay, VISA, MasterCard, 1Link, MNnet and Phoenix are financial networks working internationally. ORIX ACH and PayPal are integrated into websites for payment processing.

Frequently Asked Questions (FAQs)

FAQ 1:	What is lowerCamelCase?
Answer	lowerCamelCase is lowercase lettering on initial words and capitalization on subsequent words.
FAQ 2:	Define Polymorphism?
Answer	Polymorphism is the ability to assign different meaning or usage to an object based on context.
FAQ 3:	What is Ex?
Answer	Ex is a measurement for font height or size relative to the height of a lowercase “x” in that font family.
FAQ 4:	Define Normalization?
Answer	It is the process of removing redundant data from tables in order to improve storage efficiency, data integrity, and scalability.
FAQ 5:	What is One-To-Many Relationship?
Answer	One instance of an Entity is associated with Zero, One or Many instances of another Entity is called One-To-Many Relationship.
FAQ 6:	Define Primary Key?
Answer	The Primary Key uniquely identifies each record in a database table. Primary keys must contain UNIQUE values. A primary key column cannot contain NULL values.
FAQ 7:	Define SSL?
Answer	SSL is the standard for encrypted and authenticated communications between clients and servers on the Internet. Virtually all online purchases and browser-based financial transactions that occur on the Internet are secured by SSL.
FAQ 8:	Define Public Key Encryption?
Answer	Public key encryption is a cryptographic technique that enables users to securely communicate on an insecure public network, and reliably verify the identity of a user via digital signatures.
FAQ 9:	What are the types of Debit Card?
Answer	1. PIN-only cards 2. Dual-use cards 3. Electronic Benefits Transfer cards 4. Prepaid cards
FAQ 10:	What is Automated Clearing House?
Answer	Automated Clearing House (ACH) is an electronic network for financial transactions in the United States. ACH processes large volumes of credit and debit transactions in batches.

Test Yourself!

Please mark the correct one from the given options. You can check your answer with the Answer Key at the end of this module.

1. The term __________ means the ability to take many forms.

a. Inheritance b. Polymorphism

c. Member function d. Encapsulation

2. Unit Testing will be done by

a. Testers b. End Users

c. Customer d. Developers

3. HTML sitemap is created for

a. Search Engines b. Humans

c. Both a& B d. None of the above.

4. JSF stands for

a. Java Server Facts b. Java Services Faces

c. JavaServer Faces d. None of the above.

5. A ________specifies the actions needed to remove the drawbacks in the current design of database.

a. First Normal Form b. Second Normal Form

c. Third Normal Form d. Normal Form

6. Chose the statements which correctly specify a rule to write a SQL statement

e. SQL statements are case sensitive f. Keywords can be abbreviated to build a standard

g. SQL statements are not case sensitive h. clauses must be placed together

7. Which entity does not include in SET (secure Electronic Transaction)?
Select correct option:

a. Seller b. Buyer

c. Payment gateway d. Bank

8. SET(secure Electronic Transfer) was developed in
Select correct option:

a. 1995 b. 1996

c. 1997 d. 1999

9. Most of the electronic payment systems on internet use __________to ensure confidentiality and security of the payment information.

a.	Quantum computing	b.	Cryptology
c.	Both of the mentioned options	d.	None of the mentioned options

10. The one that you get from bank when you open your checking account is __________.

a.	Debit card	b.	Credit card
c.	Store value card	d.	Customer card

Answer Key

MCQ Number	Correct Answer
1	b
2	d
3	b
4	c
5	d
6	c
7	d
8	c
9	b
10	a

Module 3: Quality Assurance

Learning Outcomes

After completion of this learning module, you will be able to:

- Understand requirements validation techniques
- Verify system using software quality audit standards
- Execute the test cases using automated tool
- Apply appropriate testing techniques on e-commerce

Learning Unit 1: Validation and Verification

Overview

Verification and validation assure that a software system meets the user's needs. On completion of this learning unit, you will be able to understand gap analysis with followed industrial standards, quality assurance audit and quality control with reference to requirements.

1. Gap Analysis

A gap analysis is a method of assessing the differences in performance between a business' information systems or software applications to determine whether business requirements are being met and, if not, what steps should be taken to ensure they are met successfully. Gap refers to the space between "where we are" (the present state) and "where we want to be" (the target state). A gap analysis may also be referred to as a needs analysis, needs assessment or need-gap analysis.

Validation

Validation is process of examining whether or not the software satisfies the user

In software development, gap analysis tools can document which services and/or functions have been accidentally left out, which have been deliberately eliminated, and which still need to be developed.

Conducting a Gap Analysis as per Industry Standards

1. Specify the specific target objectives by looking at the SRS (software requirement specification) document.
2. Analyze current business processes of system by collecting relevant data on performance and functionalities of system from all stakeholders by conducting interviews, brainstorming and observing project activities.
3. Lastly, compare its target goals against its current state, it can then draw up a comprehensive plan that outlines specific steps to take to fill the gap between its current and required state of system, and reach its target objectives as mentioned in SRS document.

Verification

Verification is the process of confirming if the software is meeting the business requirements.

Gap Analysis Template

While a gap analysis can be either concrete or conceptual, gap analysis templates often have in common the following fundamental components:

Identifying the current and required states

Current state

A gap analysis template starts with a column that is labeled as Current State, which lists the processes and functionalities which needs to be tested.

Required state

The gap analysis report should also contains a column labeled as Required State, which outlines the target condition we needs to be achieved.

Describing the gap

Gap description

This column should first check whether a gap exists between a company's current and required state. If so, the gap description should then outline what constitutes the gap and the factors that contribute to it.

Bridging the gap

Next steps and proposals

This final column of a gap analysis report should list all the possible solutions that can be implemented to fill the gap between the current and required states.

2. Quality Assurance Audit

Do you know!

The first CMMI model was developed at the Software Engineering Institute (SEI) at Carnegie Mellon University.

Do you know!

ISO Founded on 23 February 1947, the organization It is headquartered in Geneva, Switzerland,[4] and as of 2013 works in 164 countries.

Quality assurance audit is method to improve the software. Its goal is to assess technical quality, form and function with the aim of improving aspects such as ease-of use, reliability, security and performance.

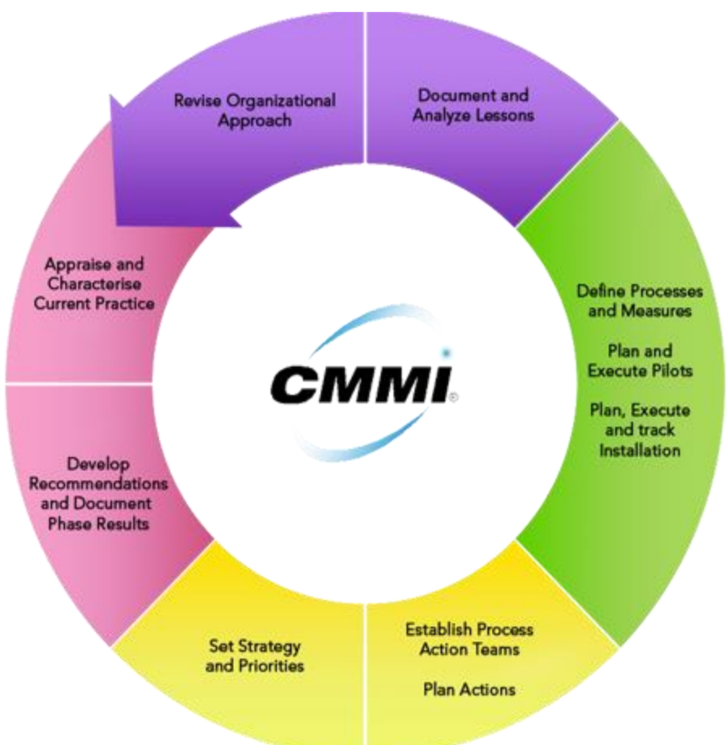
Software Quality Assurance

SQA generally works on one or more industry standards that help in building software quality guidelines and implementation strategies

Quality Assurance Standards

Capability maturity model integration (CMMI)

Capability maturity model integration (CMMI) is an approach or methodology for improving and refining the software development process within an organization.



International Organization for Standardization (ISO)

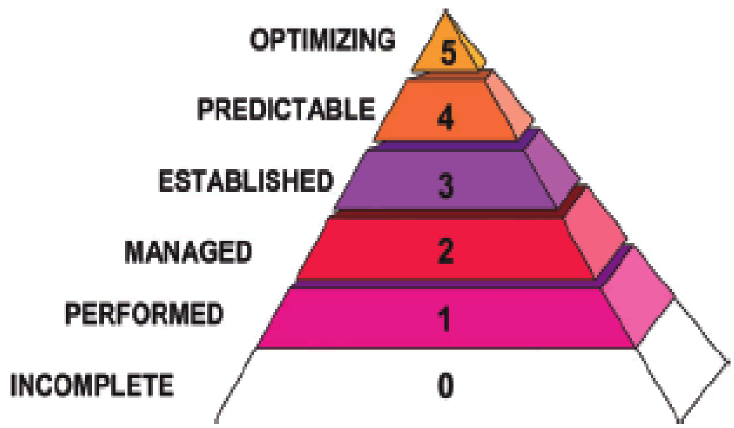
ISO is an international standard-setting body that promotes worldwide proprietary, industrial and commercial standards.

Software Process Improvement and Capability Determination (SPICE)

SPICE is a set of technical standards documents for the computer software development process and related business management functions.It is another joint International Organization for Standardization (ISO) and International Electro technical Commission (IEC) standard, which was developed by the ISO and IEC joint subcommittee

Do you know!

Software Quality Control is commonly referred to as Testing.



Institute of Electrical and Electronics Engineers (IEEE)

The Institute of Electrical and Electronic Engineers (IEEE) is a global association and organization of professionals working toward the development, implementation and maintenance of technology-centered products and services.

3. Quality Control

Software Quality Control is the set of procedures used by organizations to ensure that a software product will meet its quality goals at the best value to the customer, and to continually improve the organization’s ability to produce software products in the future.

Software quality control refers to specified functional requirements as well as non-functional requirements such as supportability, performance and usability. It also refers to the ability for software to perform well in unforeseeable scenarios and to keep a relatively low defect rate. These specified procedures and outlined requirements leads to the idea of Verification and Validation and software testing.

Remember

In software engineering a functional requirement defines a function of a system and its components. A function is described as a set of inputs, the behavior, and outputs.

Learning Unit 2: Testing

Overview

Software Testing is the evaluation of software against requirements gathered from users and system specifications. Testing is conducted at the phase level in software development life cycle (SDLC) or at module level in program code. After completion of this learning unit, you will be able to execute the test cases using automated tools and perform applicable testing techniques such as alpha, beta, integration, system, regression, stress and User Acceptance Test (UAT). Software testing comprises of Validation and Verification.

1. Usage of Testing Tools

Remember

A non-functional requirement specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.

Manual Vs Automated Testing

Testing can either be done manually or using an automated testing tool.

1. **Manual** - This testing is performed without taking help of automated testing tools. Executes the tests cases and reports the result to the manager.

2. **Automated** - This testing is a testing procedure done with aid of automated testing tools. The limitations with manual testing can be overcome using automated test tools.

A test needs to check if a webpage can be opened in Internet Explorer. This can be easily done with manual testing. But to check if the web-server can take the load of 1 million users, it is quite impossible to test manually.

Testing Approaches

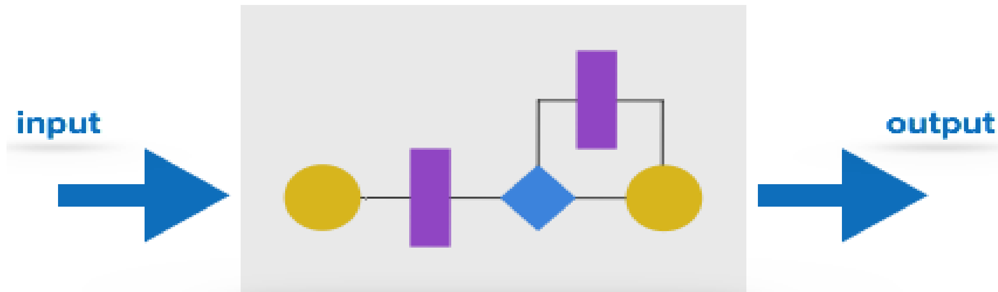
1. Black-Box testing

When functionality is being tested without taking the actual implementation in concern it is known as black-box testing (as shown below in figure) e.g. using Apache JMeter.

Black-Box

2. White-Box testing

White-box testing (as shown below in figure) is a method of testing software that tests internal structures or workings of an application, as opposed to its functionality (i.e. black-box testing). e.g. Firebug and Inspect Element not only functionality is tested but the way it is implemented is also analyzed.



White-Box

Do you know!

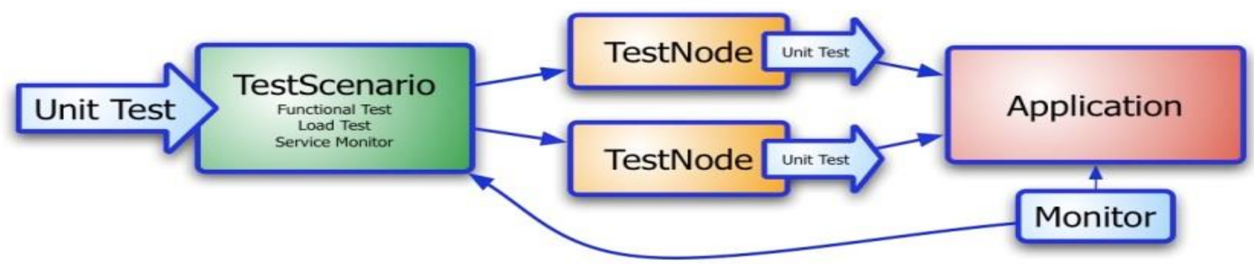
White Box testing is also known as clear box testing, glass box testing, transparent box testing, and structural testing.

Testing Levels

Testing itself may be defined at various levels of Software Development Life Cycle (SDLC). The testing process runs parallel to software development. Before jumping on the next stage, a stage is tested, validated and verified.

A. Unit Testing

While coding, the programmer performs some tests on that unit of program to know if it is error free. Testing is performed under white-box testing approach. Unit testing helps developers decide that individual units of the program are working as per requirement and are error free.



B. Integration Testing

Even if the units of software are working fine individually, there is a need to find out if the units if integrated together would also work without errors carried out by testing team.

C. System Testing

The software is compiled as product and then it is tested as a whole. This can be accomplished using one or more of the following tests:

1. Functionality Testing - Tests all functionalities of the software against the requirement.
2. Performance Testing - This test proves how efficient the software is. It tests the effectiveness and average time taken by the software to do desired task.
3. Security & Portability - These tests are done when the software is meant to work on various platforms and accessed by number of persons.

D. Acceptance Testing

When the software is ready to hand over to the customer it has to go through last phase of testing where it is tested for user-interaction and response. This is important because even if the software matches all user requirements and if user does not like the way it appears or works, it may be rejected.

1. **Alpha Testing** - Development team tries to find out how user would react to some action in software and how the system should respond to inputs.

2. **Beta Testing** - After the software is tested internally, it is handed over to the users to use it under their production environment only for testing purpose. This is not as yet the delivered product.

E. Regression Testing

Whenever a software product is updated with new code, feature or functionality, it is tested thoroughly to detect if there is any negative impact of the added code. This is known as regression testing.

Test Case

A set of conditions or variables under which a tester will determine whether a system under test satisfies requirements or works correctly, as shown in figure.

Test Scenario #:	TS03	**Tested By:**	
Sprint#:	107	**Application:**	AUT
Tracker ID:	1898	**Time Estimation:**	01:00 (HH:MM)
Module:	Search	**Type**	User Story
TEST SCENARIO / REQUIREMENT DESCRIPTION: **PREREQUISITES:** • Admin launches the page and Enters in to video search • Roles simulated:Admin, Author			
SCENARIO TITLE: Admin and video author search titles by video file name **SCENARIO PROCEDURE:** Search keyword should get the result based on video filename			
Scenario Steps		**Validation**	
Search the filname with extenstion in both Uppper and Lower case letters.		Should be Listed the records properly.	
Search the filname which doesn't have uploaded		No records found message should list	

Test Case Template

Test Script

A set of instructions (written using a scripting/programming language or generated by an automated testing tool i.e. Selenium WebDriver) that is performed on a system under test to verify that the system performs as expected.

Learn Selenium
WebDriver

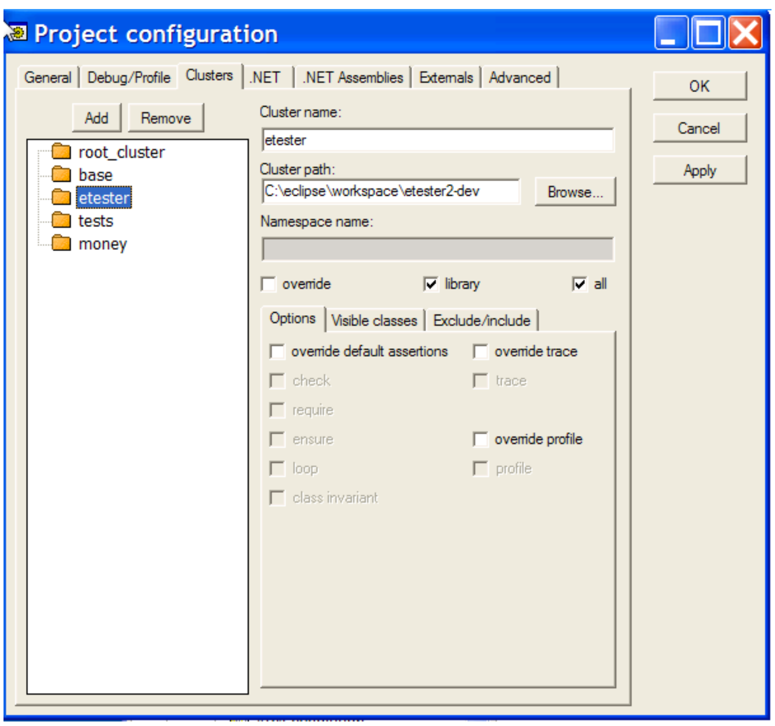
E-Tester

E-Tester is a unit-testing framework for Eiffel. It consists of three groups, which, when added to your system, will allow for easy development of test suites.

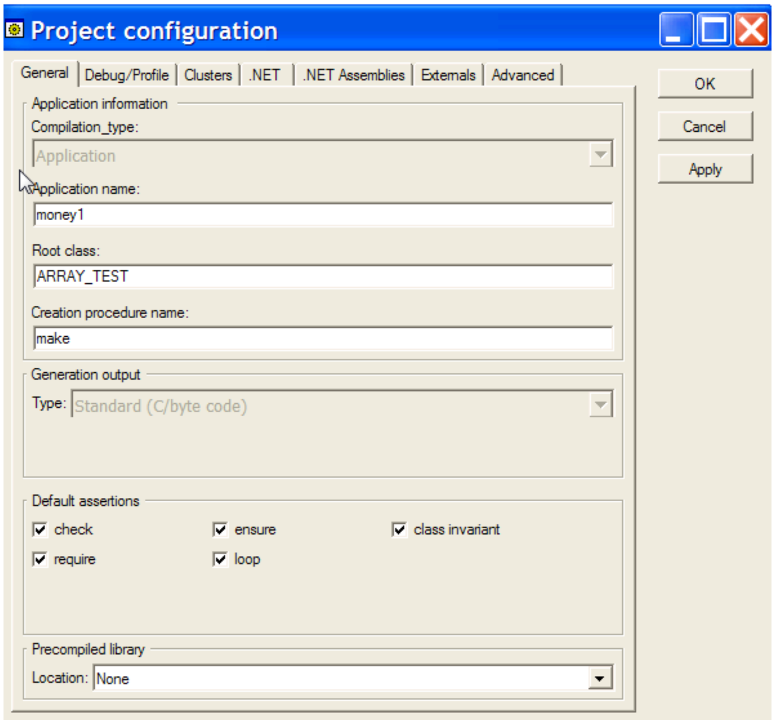
Unit Testing is an important part of Software Development. In fact, proponents of Test Driven Development (TDD) argue that unit testing should drive the development and even the design of the software. E-Tester provides a strong full-featured unit-testing framework.

A. Installation on E-Tester

1. **Download** E-Tester from here http://sourceforge.net/projects/etester/files/
2. **Download** GUI frontend (JRE required) from here http://sourceforge.net/projects/etester/files/
3. **Save** the E-Tester library into a local directory.
4. **Unzip** etester2.1.zip (should create a folder named etester2-dev)
5. **Add** the **etester2-dev** cluster to your **eiffel** system. In **EiffelStudio**, simply create a project and add the cluster by going to **Project =>** Project Settings and selecting the Clusters tab. Enter the location of **etester2-dev** and name the cluster



6. Make sure that all assertion checking is turned on



B. How to use

After installing E-Tester and E-Tester-GUI, you may begin developing your unit tests as a single class see example below

Automatic generation produced by ISE Eiffel

Classes Clusters Cluster hierarchy Chart Relations Text Flat Contracts Flat contracts Go to: ARRAY_TEST

```
class
        ARRAY_TEST

inherit
        UNIT_TEST

create
        make

feature -- creation

        make is
                        -- Run tests
                do
                        make_test
                        add_boolean_case (agent test_array_count)
                        add_violation_case (agent test_item_precondition_violation)
                        to_html ("tests.htm")
                end

feature -- test cases

        test_array_count: BOOLEAN is
                local
                        a: ARRAY [INTEGER]
                do
                        comment ("test_array_count")
                        a := <<1, 2, 3>>
                        Result := a.count = 3
                end

        test_item_precondition_violation is
                local
                        a: ARRAY [INTEGER]
                        item4: INTEGER
                do
                        comment ("test item precondition violation")
```

Output of E-Tester

E-Tester-GUI displays the output as shown below

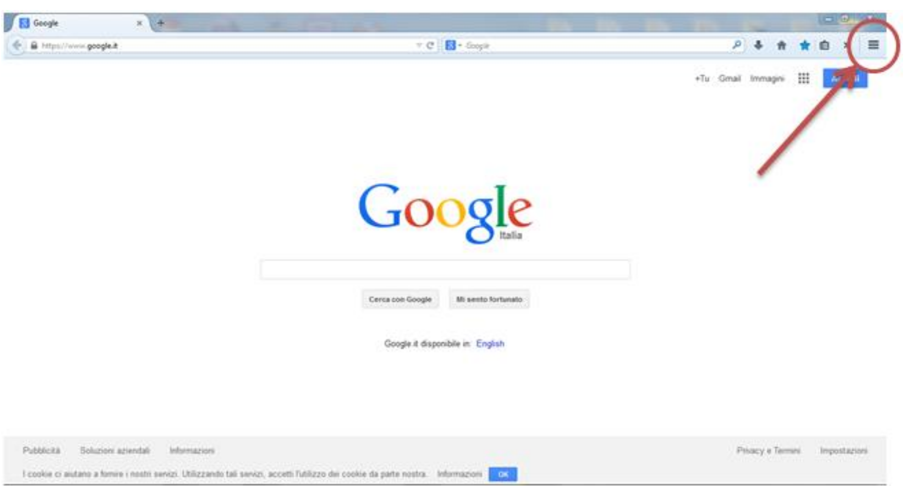
PASSED (2 out of 2)		
Case Type	Passed	Total
Violation	1	1
Boolean	1	1
All Casses	2	2
State	Contract Violation	Test Name
Test1	Array_test	
Passed	None	Test_array_count
Passed	None	*test_item_precondition_violation

Firebug

Firebug is an extension for the Mozilla Firefox browser that allows you to debug and inspect HTML, CSS, the Document Object Model (DOM) and JavaScript. It is useful for inspect the behavior of HTML/CSS, debug JavaScript detect performance of website, and track cookies and sessions.

A. Installation on Firefox

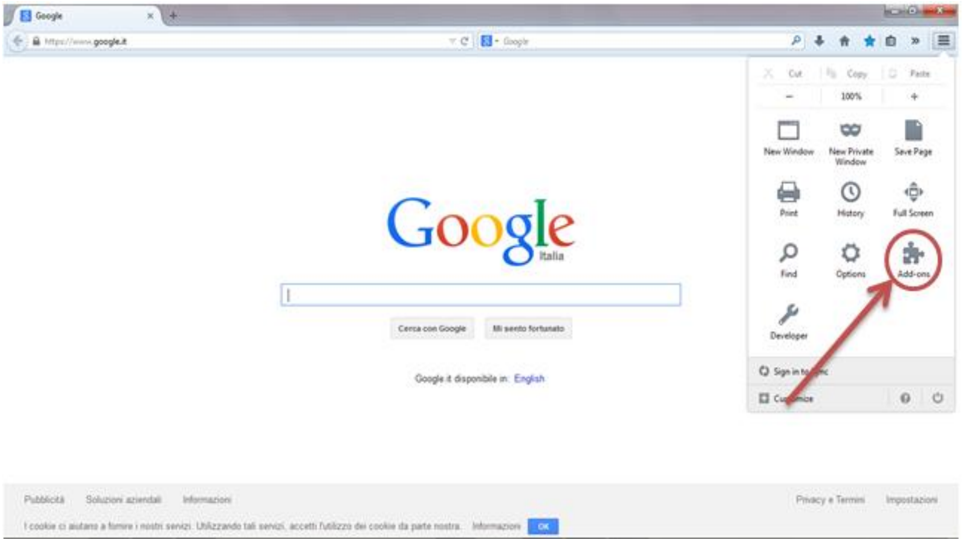
1. Open Mozilla Firefox browser and click on the Open Menu, as shown in figure



Open Menu

> **Error**
>
> These are actual coding mistakes made by developers. In addition, there is a difference in output of software and desired output, is considered as an error.

2. Click on Add-ons icon, as shown figure.

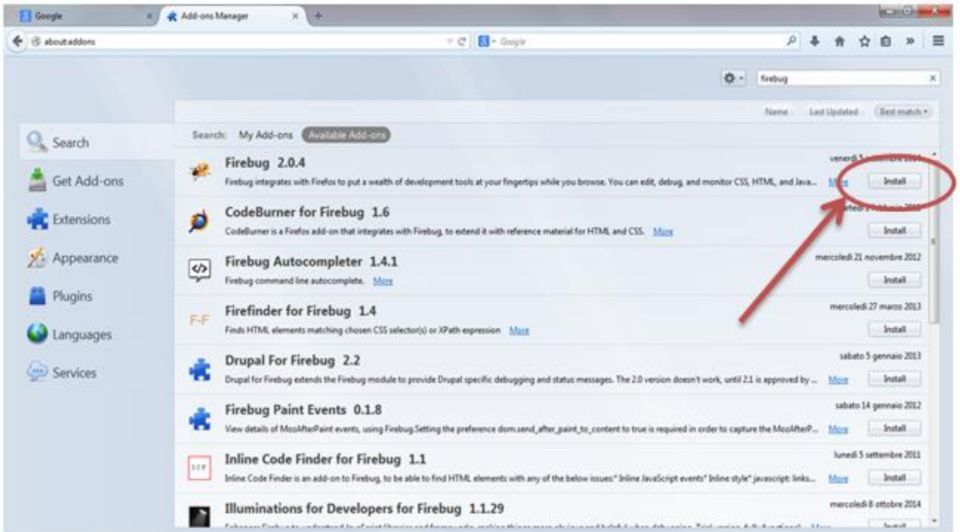


Add-ons icon

3. Type Firebug into the text area and press Enter, as shown figure.

Search Bar

4. Click on Install button next to Firebug, as shown in figure.

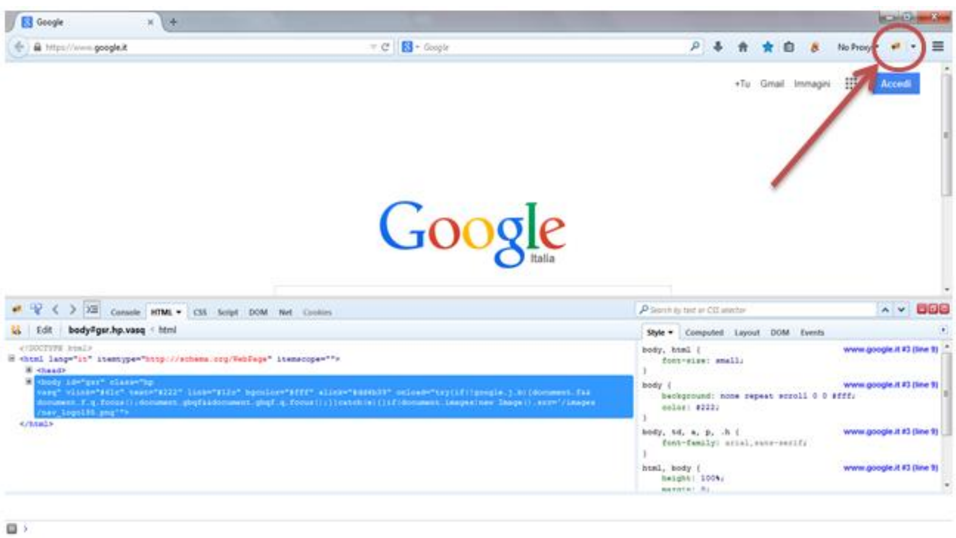


Install Button

B. How to launch Firebug and toolbar overview

There are three different ways to launch Firebug:

1. Press F12 on the keyboard.
2. Press the Firebug button on the toolbar, as shown in figure.



Firebug Button

3. In the current webpage, right click on an element (an image, text, background, etc), and in the dropdown menu click on Inspect Element with Firebug, as shown in figure.

Inspect Element

The Firebug Toolbar has this framework, as shown in figure.

Framework

Panels

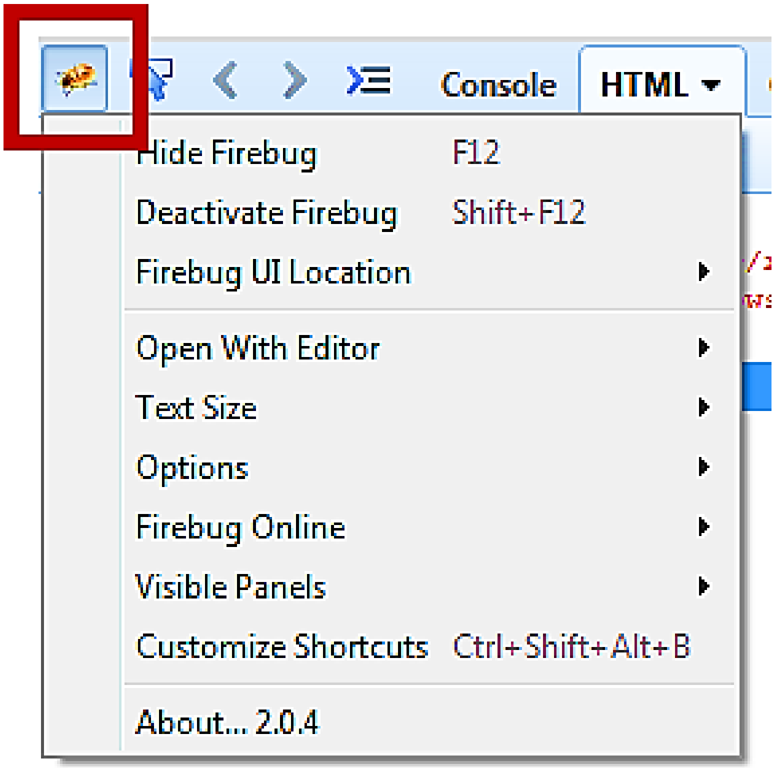
Console: Brings up an Interactive JavaScript Console.
HTML: Brings up the HTML View.
CSS: Brings up the CSS View.
Script: Brings up the JavaScript Debugger.
DOM: A list of all the DOM Properties.
Net: Displays requests made from the browser.
Cookies: Displays sessions & cookies from the browser as shown in figure.

Panels

Buttons

A. Firebug Options

By using Firebug icon we can view more options like; Text size, Visible plane, etc. as shown in figure.



Firebug Options

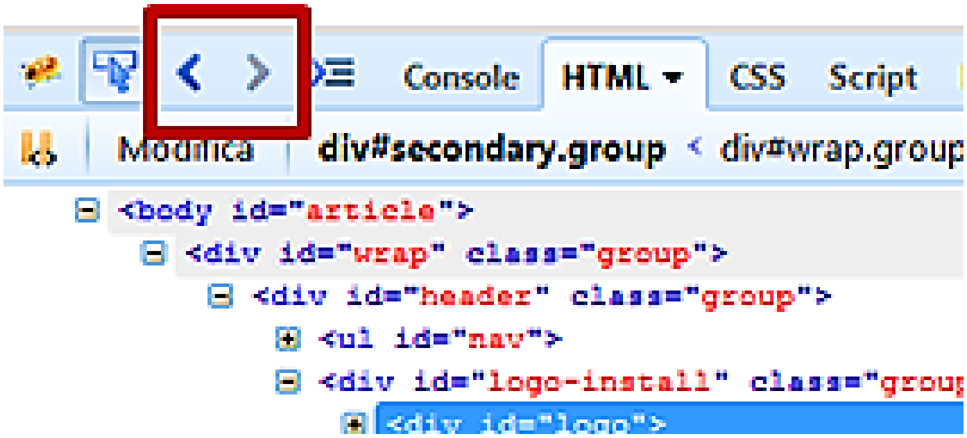
B. Inspect Element

The Inspector button allows to select an element on a website for HTML investigation. When checked, it is possible analyze the html contents in the page simply hovering the elements under inspection with the mouse. It will be displayed a blue rectangle border around the page elements. The element is also highlighted in blue in the section Html View; it is possible to modify html contents just clicking on the element, as shown in figure.

Inspect Element Detail

C. Go Back / Forward

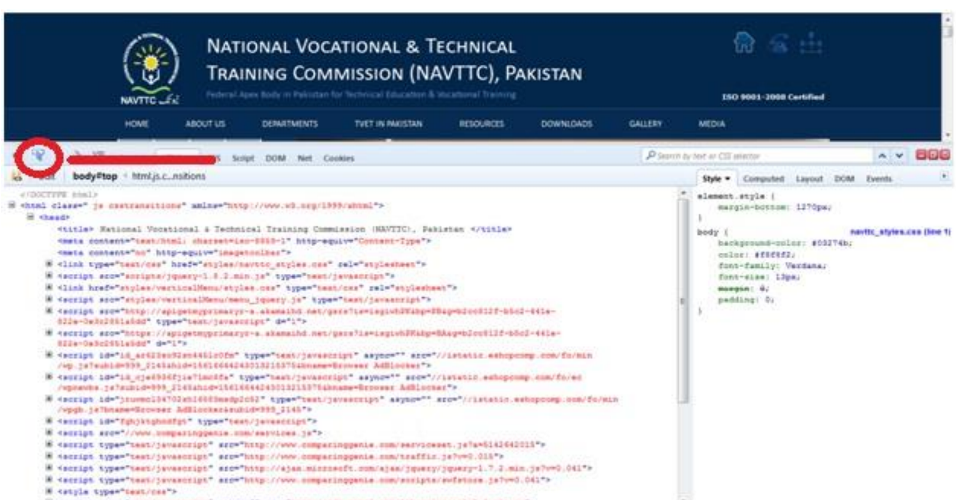
Go Back / Forward buttons switch to the previous/next panel or location list item of the navigation history, as shown in figure.



Go Back / Forward

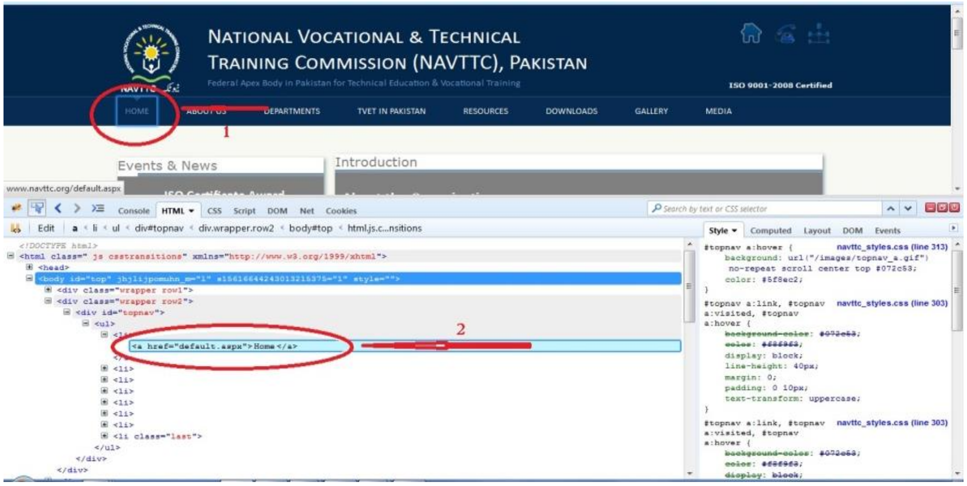
How to use Firebug

1. Open Firefox and go to your web page (i.e. http://www.navttc.org/introduction.aspx, go to the footer of this page).
2. Launch Firebug.
3. Press the Inspect Element icon, as shown in figure.



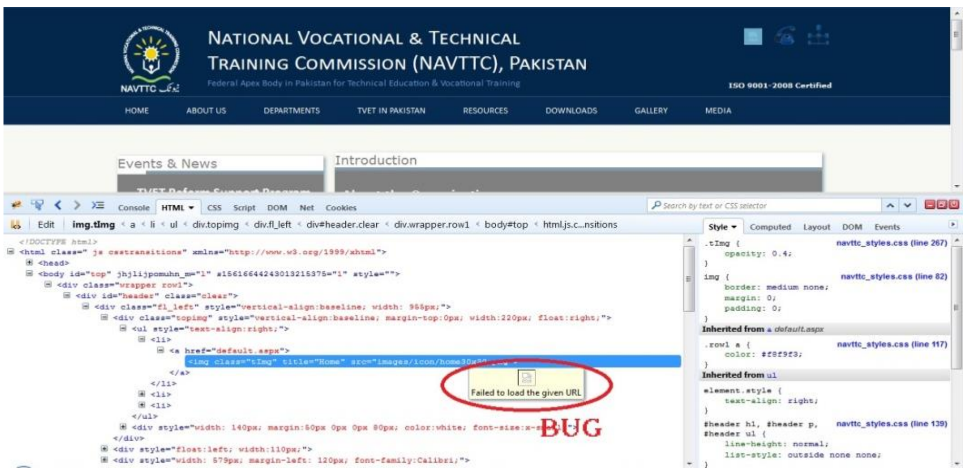
Inspect Element Icon

4. Place the cursor on the object to be analyzed (i.e. Home) and click the left button on the mouse to select it [1]. You'll see the element code [2] in the HTMLarea, as shown in figure.



Element Selection

5. In this example, you can't see the image because the file "home30x30.png" was not found. This is a kind of bug that you can easily find using the Firebug add-on, as shown in figure.



Bug Identification

6. You can check bugs also by clicking on Net button in Panel, as shown in figure.

Bugs Detail

JMeter

1. Apache project that can be used as a load testing tool for analyzing and measuring the performance of a variety of services, with a focus on web applications.

A. JMeter Requirements According the Operating System

Before installing JMeter, your system should fulfill following requirements,

Operating system	Window 7	Linux 2.4, 2.6, 3.1	Mac OS
Java Virtual Machine	Sun JDK 5, 6, 7.	Sun JDK 5, 6, 7 and Open JDK 6	JDK6
Architecture	32 bits	i386, amd64	

B. Check for Java on Windows

Before installing JMeter, just check your system is supporting Java or not, if not then install it because JMeter is a pure Java desktop application. You can verify that java is already installed in your windows machine or not using bellow given command in your command prompt. You can use the following procedure to check whether Java JDK is installed successfully in your system.

In Window/Linux – Just go to Terminal or click on start and type “command prompt”

Open the “command prompt” and type command “java –version”.

If Java run-time environment is installed successfully, you will see the output as figure below, as shown in figure.

Java Installed

If Java run-time environment is not installed successfully, you will see the output as figure below, as shown in figure.

Java Not Installed

You can get the latest version of Java SE Development Kit in the site:

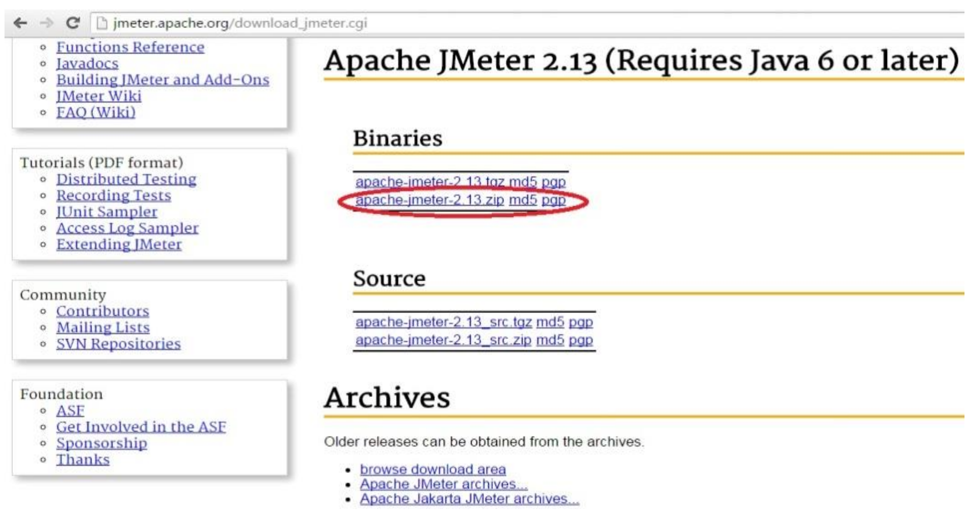
http://www.oracle.com/technetwork/java/javase/downloads/index.html, using this site download and install the latest version of Java SE Development Kit. After installation, just check java is installed successfully or not using command “Java – Version” in the command prompt, as shown in figure.

Download Java

Download and Installation Process of JMeter

A. Download process of JMeter

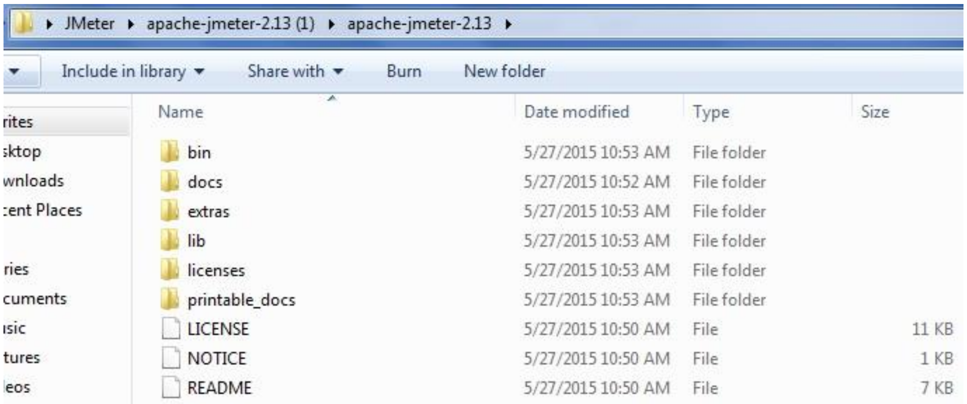
You can download JMeter from Universal Resource Locator (URL) “http://jmeter.apache.org/download_jmeter.cgi”, as shown in figure.



Download JMeter

B. Installation process of JMeter

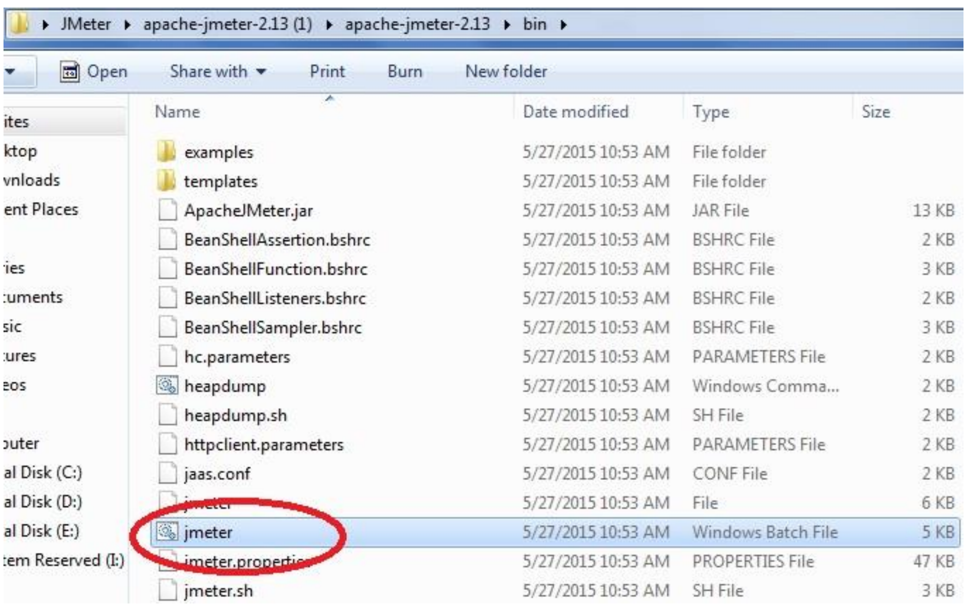
It is very simple and easy to install JMeter, just download the “.zip” or ”.tgz” file and unzip JMeter file into the directory where you want to install JMeter. A very simple and easy installation process and it’s done. After unzip process is done, the directory will look like the given below figure, as shown in figure.



JMeter Folder

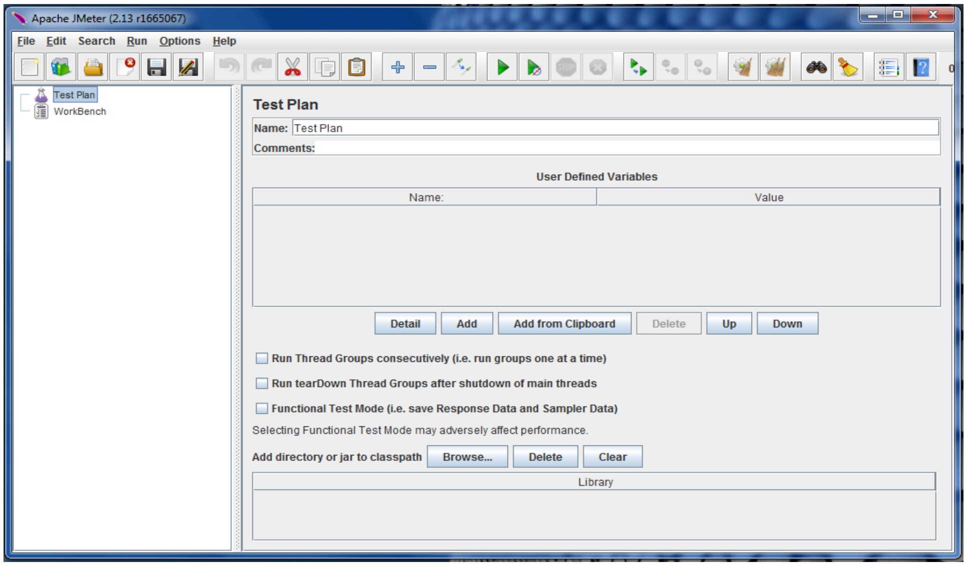
C. Start JMeter

Click on the jmeter.bat file inside /bin folder, as shown in figure



Select Batch File

Once you click on JMeter.bat, it opens JMeter, as shown in figure.

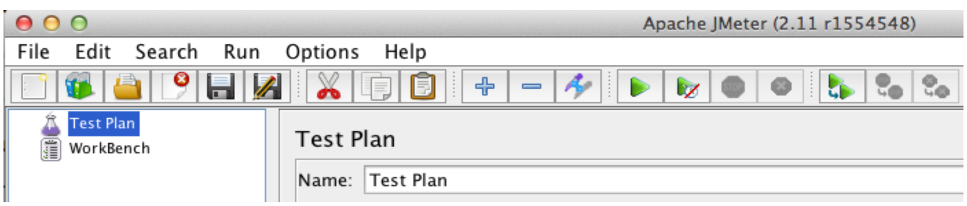


JMeter Dashboard

How To Use JMeter

A. Building a Basic Test Plan

After starting JMeter, you should see the graphical user interface (GUI) with an empty Test Plan, as shown in figure.



Test Plan

A test plan is composed of a sequence of test components that determine how the load test will be simulated. We will explain the how some of these components can be used as we add them into our test plan.

B. Add a Thread Group

1. First, add a Thread Group to Test Plan: Right-click on Test Plan”
2. “Mouse over **Add** >”
3. “Mouse over **Threads** (Users)>”
4. “**Click** on Thread Group”

The Thread Group has three particularly important properties influence the load test, as shown in figure.

Http Request

Whenever your web browser fetches a file (a page, a picture, etc.) from a web server, it does so using HTTP - that's "Hypertext Transfer Protocol". HTTP is a request/response protocol, which means your computer sends a request for some file

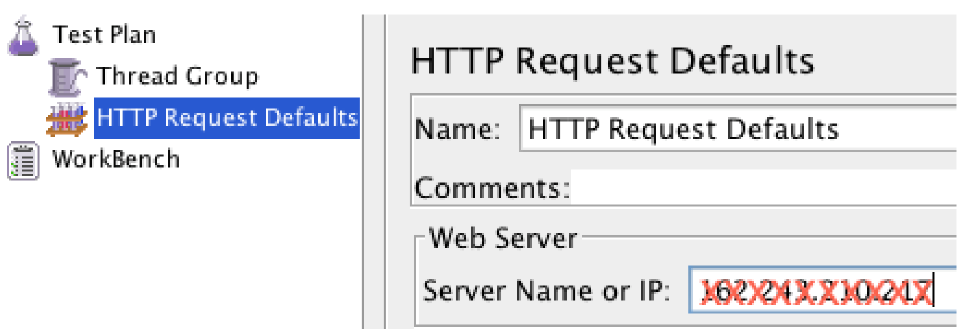
Load Test Configuration

1. **Number of Threads (users):** The number of users that JMeter will attempt to simulate. Set this, i.e. **50**.
2. **Ramp-Up Period (in seconds):** The duration of time that JMeter will distribute the start of the threads over. Set this, i.e. **10**.
3. **Loop Count:** The number of times to execute the test. Leave this set to i.e.**1**.

C. Add an HTTP Request Defaults

The HTTP Request Defaults Config Element is used to set default values for HTTP Requests in our test plan. This is particularly useful if we want to send multiple HTTP requests to the same server as part of our test. Now let's add HTTP Request Defaults to Thread Group:

1. Select Thread Group, then Right-click it
2. Mouse over Add >
3. Mouse over Config Element >
4. Click on HTTP Request Defaults



Load Test Server Information

In HTTP **Request Defaults**, under the Web Server section, fill in the Server Name or IP field with the name or IP address of the web server you want to test. Setting the server here makes it the default server for the rest of the items in this thread group, as shown in **figure**.

D. Add an HTTP Cookie Manager

If your web server uses cookies, you can add support for cookies by adding an HTTP Cookie Manager to the Thread Group:

1. Select Thread Group, then Right-click it
2. Mouse over Add >
3. Mouse over Config Element >
4. Click on HTTP Cookie Manager

E. Add an HTTP Request Sampler

Now you will want to add an HTTP Request sampler to Thread Group, which represents a page request that each thread (user) will access:

1. Select Thread Group, then Right-click it
2. Mouse over **Add** >
3. Mouse over **Sampler** >
4. Click on **HTTP Request**

In HTTP Request, under the HTTP Request section, fill in the Path with the item that you want each thread (user) to request. We will set this to /, so each thread will access the homepage of our server. Note that you do not need to specify the server in this item because it was already specified in the HTTP Request Defaults item.

Note: If you want to add more HTTP Requests as part of your test, repeat this step. Every thread will perform all of the requests in this test plan.

F. Add a View Results in Table Listener

In JMeter, listeners are used to output the results of a load test. There are a variety of listeners available, and the other listeners can be added by installing plugins. We will use the Table because it is easy to read.

1. Select **Thread Group**, then Right-click it
2. Mouse over **Add** >
3. Mouse over **Listener** >
4. Click on **View Results in Table**

You may also type in a value for Filename to output the results to a CSV file.

G. Run the Basic Test Plan

Now that we have our basic test plan set up, let's run it and see the results.

1. First, save the test plan by clicking on **File** then **Save**
2. Then specify your desired file name. Then select on **View** Results in Table in the left pane
3. Then click Run from the main menu then click Start (or just click the green Start arrow below the main menu).

4. You should see the test results in the table as the test is run, as shown in figure.

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status
1	15:43:53.417	Thread Group 1-1	HTTP Request	134	
2	15:43:53.618	Thread Group 1-2	HTTP Request	128	
3	15:43:53.819	Thread Group 1-3	HTTP Request	138	
4	15:43:54.018	Thread Group 1-4	HTTP Request	137	
5	15:43:54.220	Thread Group 1-5	HTTP Request	134	
6	15:43:54.420	Thread Group 1-6	HTTP Request	134	

Load Test Report

H. Interpreting the Results

You will probably see that the Status of all the requests is "Success" (indicated by a green triangle with a checkmark in it). After that, the columns that you are probably most interest in are the Sample Time (ms) and Latency (not displayed in example) columns.

1. Latency:

The number of milliseconds that elapsed between when JMeter sent the request and when an initial response was received

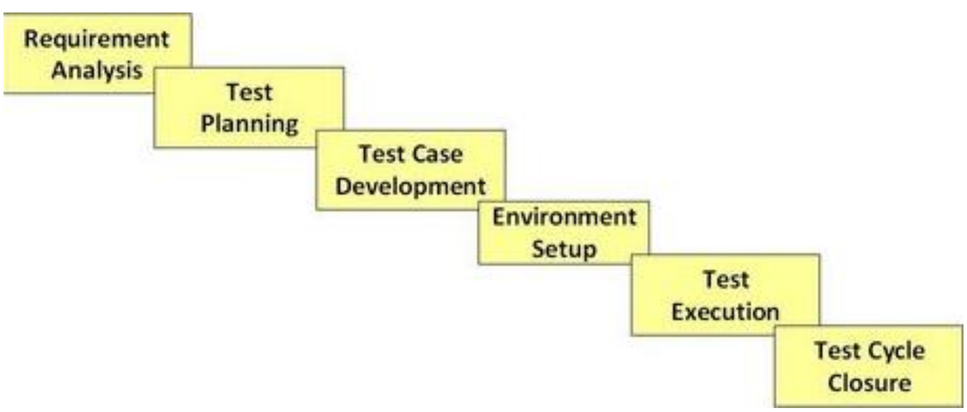
2. Sample Time:

The number of milliseconds that the server took to fully serve the request (response + latency)

According to the table that was generated, the range of Sample Time was 128-164 ms. This is a reasonable response time for a basic homepage (which was about 55 KB). If your web application server is not struggling for resources, as demonstrated in the example, your Sample Time will be influenced primarily by geographical distance (which generally increases latency) and the size of the requested item (which increases transfer time). Your personal results will vary from the example.

User Acceptance Test (UAT)

The last phase of the software testing process. During UAT, actual software users test the software to make sure it can handle required tasks in real-world scenarios, according to specifications. The generic sequential test life cycle is shown in figure.



Generic Sequential Test Life Cycle

Error Log

A document dynamic in nature which contains the current status of all the errors or bugs uncovered during testing of a software application this comprehensive report must have but not limited to following fields,

1. Test case ID
2. Description
3. Result(s)
4. How to reproduce (sequential steps)
5. Severity level(s) as (Catastrophic, Critical, High, Medium, Low)
6. Test Type as (GUI, Functional, Database, Services, etc.)
7. Priority to Fix
8. Assigned to
9. Executed by
10. Date and Time
11. Status such as (open, closed, pending, rejected,Re-open,etc.)
12. Remarks
13. Attached file, if applicable

2. Testing Techniques Including Quality Measurement Indicator

Software Quality Attributes

Computer systems are used in many critical applications where a failure can have serious concerns (loss of lives or property). The ultimate goal is the ability to quantitatively evaluate and trade off multiple software quality attributes to arrive at a better overall system.

Do you know!

Quality: is conformance to requirements. Effectiveness is the successful delivery of producing desired results. Efficiency ensures the achievement of maximum productivity with minimum waste.

A. Maintainability

Suitability for debugging (correction of errors) and for modification and extension of functionality. The maintainability of a software system depends on;

1. Readability

Readability of a software system depends on its:

- Programming style
- Consistency in coding
- Readability of programming code
- Testing of the system
- Quality of the documentation

2. Extensibility

Extensibility allows required modifications at the appropriate locations to be made without undesirable side effects. Extensibility of a software system depends on its:

- Modularity of the software system
- Availability of comprehensible program documentation

3. Testability

Suitability for allowing the programmer to follow program execution (runtime behavior under given conditions) and for debugging. The testability of a software system depends on its:

- Modularity well-structured programs prove more suitable for systematic, stepwise testing than solid, unstructured programs.

B. Integrity

This concept refers to the protection of the software application and similar files including data. Generally it is being applied as password protection, user rights, etc.

C. Robustness

Robustness reduces the impact of operational mistakes, invalid input data, and hardware errors.

A software system is robust if the consequences of an error in its operation, in the input, or in the hardware, in relation to a given application, are inversely proportional to the probability of the occurrence of this error in the given application.

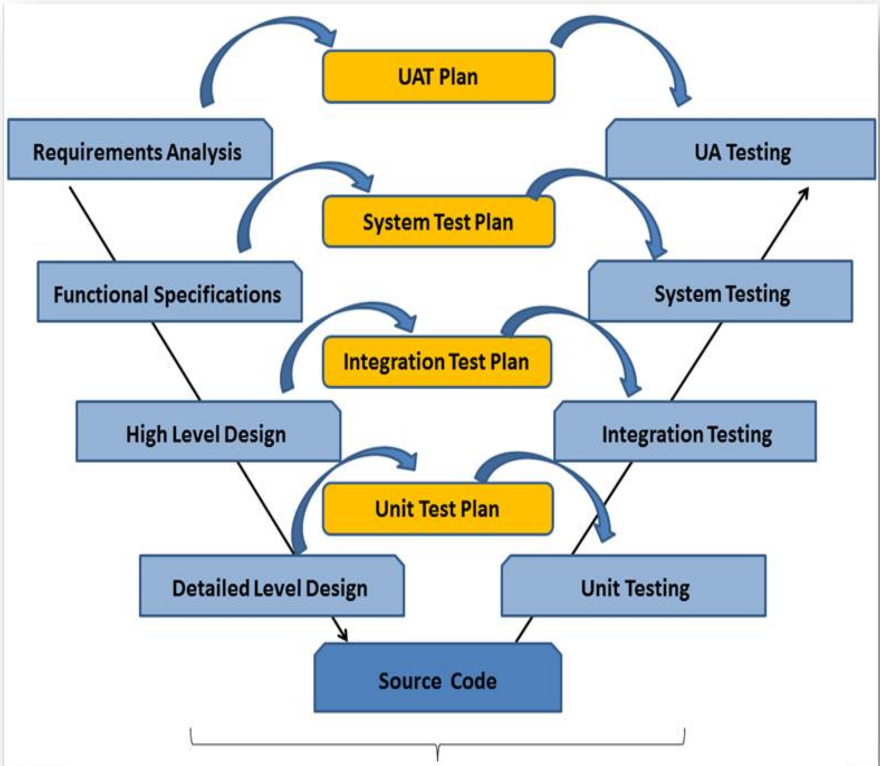
- Frequent errors (e.g. wrong commands, typing errors) must be handled with particular care.
- Less frequent errors (e.g. power failure) can be handled more laxly, but still must not lead to irreversible consequences.

D. Responsiveness

An approach to web page creation that makes use of flexible layouts, flexible images and cascading style sheet media queries. The goal of responsive design is to build web pages that detect the visitor’s screen size and orientation and change the layout accordingly. This can be achieved using specialized utilities including twitter bootstrap.

Procedure of Testing

The testing procedure is illustrated below:



Learner's Activities

Description This activity consists of a training session to disable cache in Firebug utility.
Time 30 minutes

Purpose To understand the working of Firebug.

Instructions Ask learners to perform the following steps;

1. Install Firefox web browser.
2. Install latest version of Firebug from extension.
3. Press F12.
4. Open a valid URL.
5. Select "**Disable Browser Cache**" from Net drop down menu.

Description This activity consists of a training session to check load management with any number of users for any live web page having user activity.

Time 40 minutes

Purpose To understand the working of JMeter testing tool.

Instructions Ask learners to perform the following steps;

1. Install JMeter.
2. Open through Batch file.
3. Create Project.
4. Configure number of users.
5. Set the connections to thread, IP and ports
6. Save it.

Summary of Module

- Gap analysis checks the gap between current state and required state of a software application. Quality assurance audit is method to improve the software by comparing to CMMI/ISO/SPICE/IEEE. Quality control is used to find the defects with reference to requirements.

- Quality is the conformance to requirements. Software Testing is the evaluation of software against requirements gathered from users and system specifications. Software testing techniques are automated; black, white-box; unit, integration, system; alpha, beta; and regression.

- User Acceptance Test (UAT) actually test the software to make sure it can handle required tasks in real-world scenarios, according to specifications, carried out by customer organization. Error Log is a tabular form test results.

- Maintainability, Security and Robustness are general non-functional software requirements to maintain quality. Test Case is set of conditions or variables under which a tester will determine whether a system under test satisfies requirements or works correctly. Test Environment means an infrastructure where fresh system software applications are installed with minimum requirements. Test team analyzes the customer requirements to write test cases and then execute them on every build handed over to them.

Frequently Asked Questions (FAQs)

FAQ 1:	What is Gap Analysis?
Answer	A gap analysis is a method of assessing the differences in performance between a business' information systems or software applications to determine whether business requirements are being met and, if not, what steps should be taken to ensure they are met successfully.
FAQ 2:	What is ISO?
Answer	ISO is an international standard-setting body that promotes worldwide proprietary, industrial and commercial standards.
FAQ 3:	What is the benefit of test independence?
Answer	It avoids author's bias in defining effective tests.
FAQ 4:	What is beta testing?
Answer	Testing performed by potential customers at their own locations.
FAQ 5:	What is functional system testing?
Answer	Testing the end to end functionality of the system as a whole is defined as a functional system testing.
FAQ 6:	What are the benefits of Independent Testing?
Answer	Independent testers are unbiased and identify different defects at the same time.
FAQ 7:	In web development which tool is good to analyze and measuring the performance.
Answer	Apache project tool is good to analyze and measuring the performance.
FAQ 8:	When "Regression Testing" should be performed?
Answer	After the software has changed or when the environment has changed Regression testing should be performed.
FAQ 9:	What is the difference between re-testing and regression testing?
Answer	Re-testing ensures the original fault has been removed; regression testing looks for unexpected side effects.
FAQ 10:	What is black box testing?
Answer	Black box testing is the software testing method which is used to test the software without knowing the internal structure of code or program.

Test Yourself!

Please mark the correct one from the given options. You can check your answer with the Answer Key at the end of this module.

1. ISO stands for __________.

a. International Standard Organization
b. International Student Organization
c. Integrated Services Organization
d. None of the above.

2. IEEE Standard was adopted by the __________.

a. ISO
b. ANSI
c. OSI
d. None of the above

3. What is NOT a test type?

a. Alpha
b. Beta
c. Black box
d. Unit

4. Side effects are checked in __________.

a. White-box
b. Regression
c. Re-Testing
d. Load

5. Quality attribute of Integrity is related to __________.

a. Security
b. Functionality
c. Stress
d. GUI

6. UAT stands for __________.

a. Uniform Acceptance Test
b. Universal Acceptance Test
c. User Acceptance Test
d. User Availability Test

7. What is Quality?

a. Testing
b. Conformance to requirements
c. Checking
d. Standards

Answer Key

MCQ Number	Correct Answer
1	a
2	b
3	d
4	b
5	a
6	c
7	b

Module 4: E-Marketing

Learning Outcomes

After completion of this learning module, you will be able to:

- Understand methods and techniques of Search Engine Optimization (SEO)
- Demonstrate methods of supply chain management used in E-marketing
- Learn methods of social media marketing

Learning Unit 1: Search Engine Optimization (SEO)

Overview

SEO stands for Search Engine Optimization. It is used to optimize a website for search engines. After completion of this learning unit, you will be able to understand SEO Methods like Getting Indexed, Preventing Crawling, and Increasing Prominence, demonstrate techniques of SEO such as implement Black Hat and White hat, Employ SEO Keywords and Use SEO tools like Fire bug 2.0 and Inspect Element.

Crawling

Process of fetching all the web pages linked to a website. This task is performed by software called crawler or spider.

1. SEO Methods

Getting Indexed

Search engines use crawlers to find pages for their algorithmic search results. Pages that are linked from other search engine indexed pages do not need to be submitted because they are found automatically. Two major directories, the Yahoo Directory and DMOZ both require manual submission and human editorial review. Google offers Google Webmaster Tools, for which an XML Sitemap feed can be created and submitted for free to ensure that all pages are found, especially pages that are not discoverable by automatically following links.

Search engine crawlers may look at a number of different factors when crawling a site. Not every page is indexed by the search engines. Distance of pages from the root directory of a site may also be a factor in whether or not pages get crawled.

Do you know!

In March 2007, Google warned web-masters that they should prevent indexing of internal search results because those pages are considered search spam.

Preventing Crawling

To avoid undesirable content in the search indexes, webmasters can instruct spiders not to crawl certain files or directories through the standard robots.txt file in the root directory of the domain. Additionally, a page can be explicitly excluded from a search engine's database by using a metatag specific to robots.

When a search engine visits a site, the robots.txt located in the root directory is the first file crawled. The robots.txt file is then parsed, and will instruct the robot as to which pages are not to be crawled. As a search engine crawler may keep a cached copy of this file, it may on occasion crawl pages a webmaster does not wish crawled. Pages typically prevented from being crawled include login specific pages such as shopping carts and user-specific content such as search results from internal searches.

Remember

Robot.txt is file which gives instructions on what not to spider within your Web site.

Increasing Prominence

A variety of methods can increase the prominence of a webpage within the search results.

- Cross linking between pages of the same website to provide more links to important pages may improve its visibility.

Do you know!

Search engines may penalize sites they discover using black hat methods, either by reducing their rankings or eliminating their listings from their databases altogether.

- Writing content that includes frequently searched keyword phrase, so as to be relevant to a wide variety of search queries will tend to increase traffic.
- Updating content so as to keep search engines crawling back frequently can give additional weight to a site.
- Adding relevant keywords to a web page's metadata, including the title tag and Meta description, will tend to improve the relevancy of a site's search listings, thus increasing traffic.
- URL normalization of web pages accessible via multiple URLs, using the canonical link element or via 301 redirects can help make sure links to different versions of the URL all count towards the page's link popularity score.

2. SEO Techniques

SEO techniques are classified into two broad categories:

1. **White Hat SEO** - Techniques that search engines recommend as part of a good design.
2. **Black Hat SEO** - Techniques that search engines do not approve and attempt to minimize the effect. These techniques are also known as spamdexing.

White Hat SEO

An SEO approach is considered as White Hat if it has the following features:

Do you know!

White Hat SEO is more frequently used by those who intend to make a long-term investment on their website and also called ethical SEO.

i. It conforms to the search engine's guidelines.

ii. It does not involve in any deception.

iii. It ensures that the content a search engine indexes, and subsequently ranks, is the same content a user will see.

iv. It ensures that web page content should have been created for the users and not just for the search engines.

v. It ensures good quality of the web pages.

vi. It ensures availability of useful content on the web pages.

Some examples of White Hat SEO techniques include using keywords and keyword analysis, back linking, link building to improve link popularity, and writing content for human readers.

Black Hat or Spamdexing

An SEO tactic, is considered as Black Hat or Spamdexing if it has the following features:

i. Attempting ranking improvements that are disapproved by the search engines and involve deception.

ii. Redirecting users from a page that is built for search engines to one that is more human friendly.

iii. Redirecting users to a page that was different from the page the search engine ranked.

iv. Serving one version of a page to search engine spiders/bots and another version to human visitors. This is called Cloaking SEO tactic.

v. Using hidden or invisible text or with the page background color, using a tiny font size or hiding them within the HTML code such as "no frame" sections.

vi. Repeating keywords in the metatags, and using keywords that are unrelated to the website content. This is called metatag stuffing.

vii. Calculated placement of keywords within a page to raise the keyword count, variety, and density of the page. This is called keyword stuffing.

viii. Creating low-quality web pages that contain very little content but are instead stuffed with very similar keywords and phrases. These pages are called Doorway or Gateway Pages.

ix. Mirror websites by hosting multiple websites - all with conceptually similar content but using different URLs.

x. Creating a rogue copy of a popular website which shows contents similar to the original to a web crawler, but redirects web surfers to unrelated or malicious websites. This is called page hijacking.

Remember

Always follow a White Hat SEO tactic and do not try to fool your site visitors. Be honest and you will definitely get something more.

Always stay away from any of the above Black Hat tactics to improve the rank of your site. Search engines are smart enough to identify all the above properties of your site and ultimately you are not going to get anything.

Grey Hat

Another category sometimes used is grey hat SEO. This is in between black hat and white hat approaches where the methods employed avoid the site being penalized however do not act in producing the best content for users, rather entirely focused on improving search engine rankings.

3. SEO Keywords

A keyword, in the context of search engine optimization, is a particular word or phrase that describes the contents of a Web page. Keywords are intended to act as shortcuts that sum up an entire page. Keywords form part of a Web page’s metadata and help search engines match a page to with an appropriate search query.

For example, *car* is a keyword. It seems simple enough: just figure out a couple of great keywords and go! Unfortunately, there’s more to picking keywords than that. Say you’ve got a Web site that specializes in selling custom-made classic automobiles. But the site isn’t receiving the traffic (number of visitors) it should. Here’s a tip: Think about what kind of keywords you used in your Web site. You might be using general words like [automobiles] and [vehicles], but how many people actually type in a search query of [classic automobiles]? Nine times out of ten people are going to be looking for [classic cars]. Little distinctions like this can make a big difference in the traffic you’re receiving.

Keywords and Translation:

Targeting users in different languages and countries is always challenging for web content strategists and web content authors whenever they create multilingual content for global campaigns. In most cases, the content is translated from a source language into other languages. It is not as common that content would be created natively in each target language. For multilingual content to have the desired results including:

1) search engines indexing it and,

2) users acting on it

You will always need to consider the find ability and usefulness of the content in the new language in order for it to be effective.

4. Use of SEO Tools

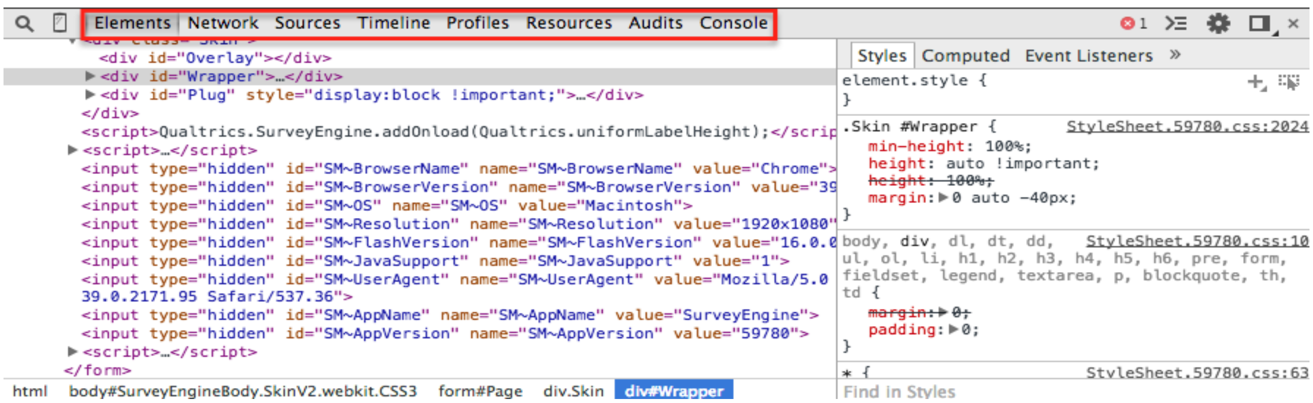
Here are few open source Search Engine Optimization tools.

1. **Firebug 2.0**

   Firebug is one of the most important SEO plugins for Firefox. It's an invaluable part of search marketer's toolkit.

2. **Inspect Element**

   Inspect element is a developer tool that allows you to see the HTML, CSS, and JavaScript that is currently on a webpage.



Accessing Inspect Element

On nearly any webpage you right click and select "inspect element". This pull ups the developers console where you see the HTML and CSS of the webpage. You can also access other developer tools like a mobile device emulator and a list of the network's GET and POST requests.

I. **Elements**

Shows the HTML for the current page

II. **Network**

Shows all the GET and POST requests that are made while the developers console is open. You can also identify the requests that are taking the longest to process.

III. **Sources**

Do you know!

Qualtrics is a private research software company based in Provo, Utah.

Allows you to see the JavaScript files (and other files) associated with the page. This is most used for debugging as a web page is being developed, but can be helpful for coding your own JavaScript in Qualtrics as well.

The timeline shows you where time is invested when a web page is loaded/ refreshed. It logs GETs, PUTs, calculations, parsing JavaScript, etc.

IV. Profiles

Also helps see where time is being spent on a page. You can record time spent by function, by JavaScript Object, and by script

V. Resources

Let's you inspect the resources that are loaded onto a page. (i.e. cookies)

Audits: Analyzes a page as it is loading and then gives suggestions to decrease the load time

VI. Console

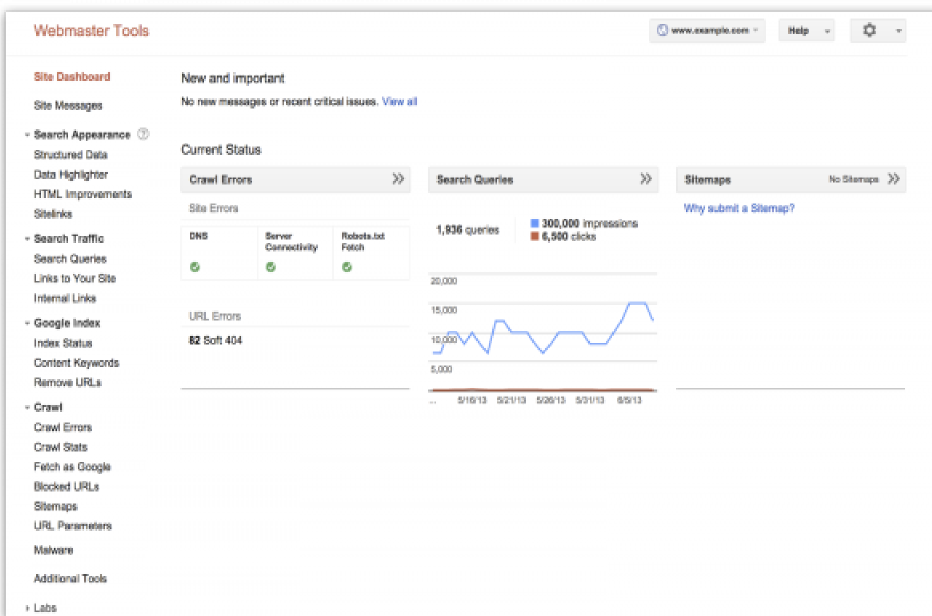
This is a JavaScript console where you can try out code as if you were coding it for the webpage. You can use it to log information about your debugging, to test out code snippets, etc.

5. Demonstrating SEO Techniques to Priorities Website Using Automated Tools

The procedure of using Google webmaster an automated SEO tool has the following steps:

1. Sign in to **GWMT** using your Gmail account. From there, you'll enter the **URL** of your website. You'll also need to verify that you're the owner of the site.

2. Once you've set up and verified your account, you'll be able to access the GWMT from one dashboard. Following are the tabs on the left.



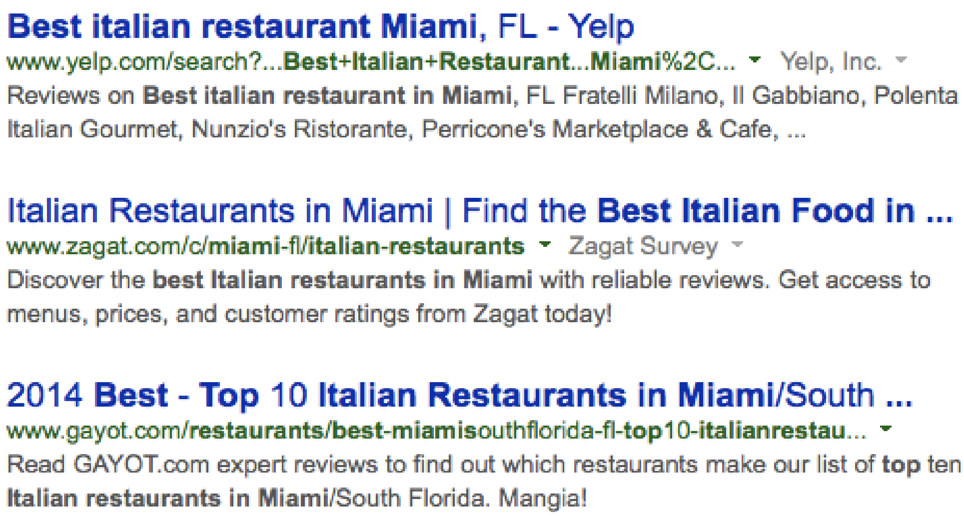
Site Messages

Google communicates with you here.

Search appearance

a) Structured data

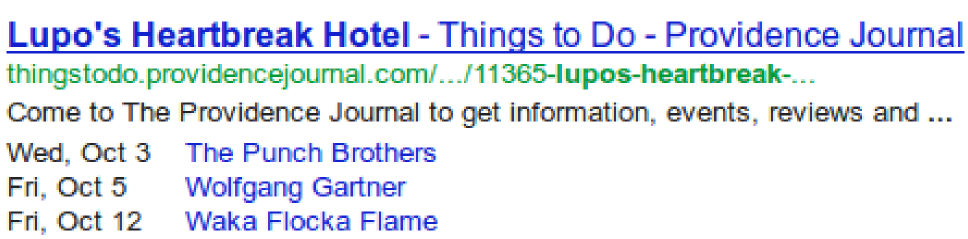
- When you do a search, you're presented with a list of relative links. Each link has a brief description under it, which helps users decide which link is best suited for their needs. For example, when you Google "Best Italian restaurant in Miami," you get these results with snippets under each link.



- You can control what those snippets say about your business creating structured data, which is what Google uses to create your snippet.

b) Data highlighter

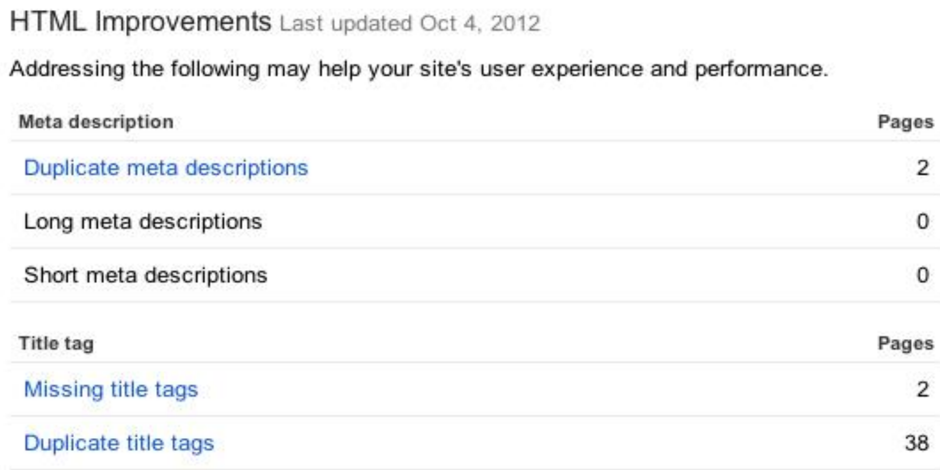
- A tool to teach Google what's important on your site. Highlight certain types of data and categorize it. For instance, if a local hotel highlights text about its upcoming concert series and categorizes it under "event," Google will showcase it in a search like this:



- There are several kinds of data that you can highlight including: articles, events, local businesses, restaurants, products, software applications, movies, TV episodes and books.
- Like the structured data tool, you're telling Google what information should show up when your site is searched.

c) HTML Improvements

- If there is something you can do to make your user's experience better, Google will let you know in the HTML improvement section. Here's a look at what might appear:



HTML Improvements Last updated Oct 4, 2012

Addressing the following may help your site's user experience and performance.

Meta description	Pages
Duplicate meta descriptions	2
Long meta descriptions	0
Short meta descriptions	0

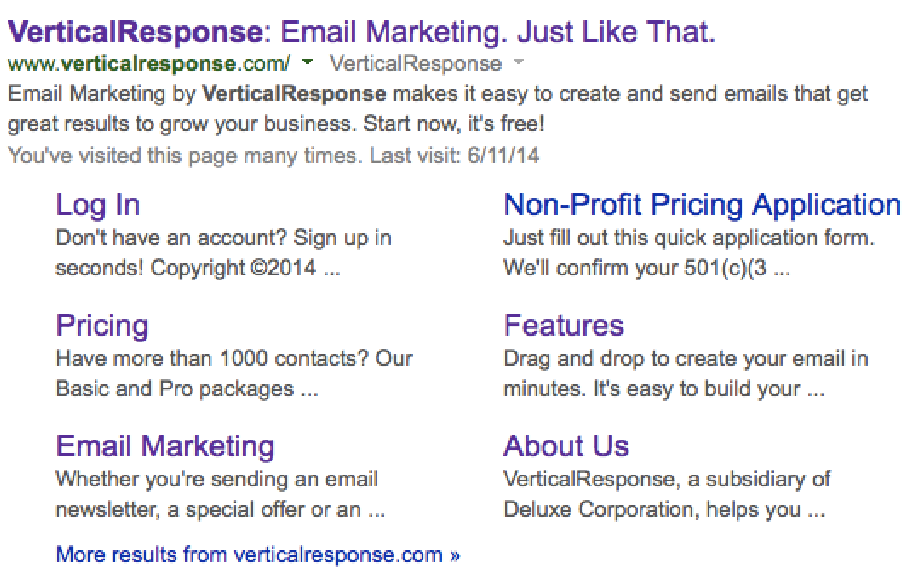
Title tag	Pages
Missing title tags	2
Duplicate title tags	38

- You might see suggestions like “duplicate meta descriptions.” You’d fill out this field to describe a particular entry. For example, when you write a blog post, you’d put a brief description of the post in the Meta description field. You don’t want duplicates, so Google will warn you about something like that in the HTML improvement section.

- You’ll also see title tag suggestions. These titles are what show up as links in the search. For example, when you search “Vertical Response,” the purple text is the title tag and clickable link. These suggestions will help you fine tune your titles so searchers know what your site is all about.

d) Site links

- You know those additional links that show up under the search results? They’re called site links. For instance, when you search “Vertical Response” you not only get the link to the main page, you also get a series of other links, like the “Log In” and “Pricing” links that you see below. These are site links.



- Right now, Google selects these links for you, but through this tab on GWMT, you can demote a link if you don’t want it to appear in your search results. Just put in the URL of that particular page and click “demote.”

Search Traffic

a) Search queries

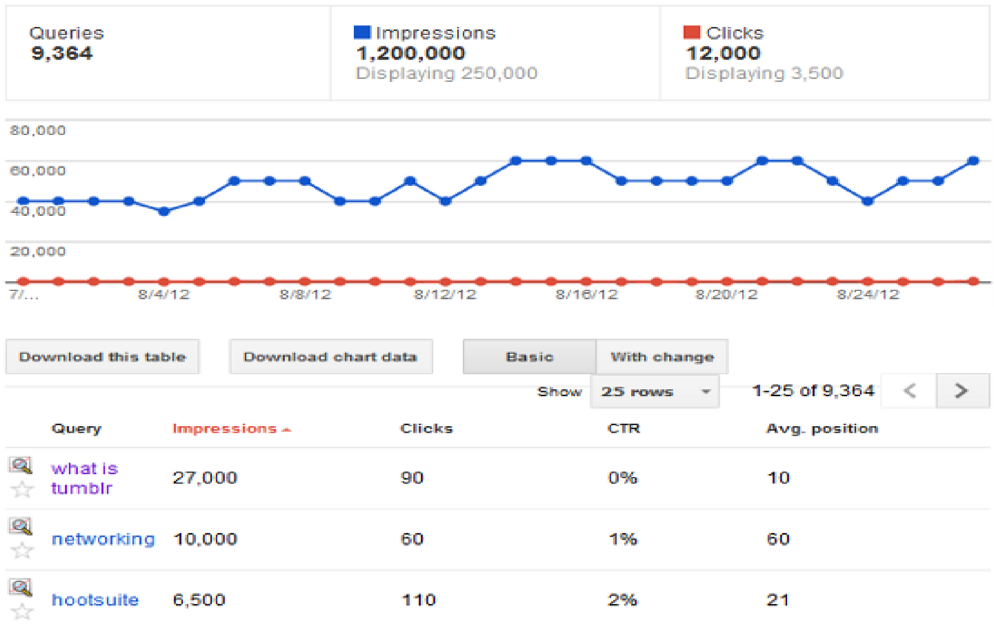
- This is probably the most beneficial tab on the GWMT. Here you'll find out how people get to your website.

Impression

Impressions are the number of times that your site showed up in search results.

Clicks

Clicks are the number of times people actually selected your website from the results.



- You'll see a list of search terms that led people to your site, which is a valuable tool. You assume you know which words people are using to find your site, but this list can reveal terms that you weren't even thinking of.
- Business owners can use this information to add products, remove under-performing products, and create relevant blog content that uses these keywords."
- The search queries page will also show you a graph of impressions and clicks.
- To keep these stats high, one of the best ways is to keep your site updated regularly with high quality content.

b) Links to your site

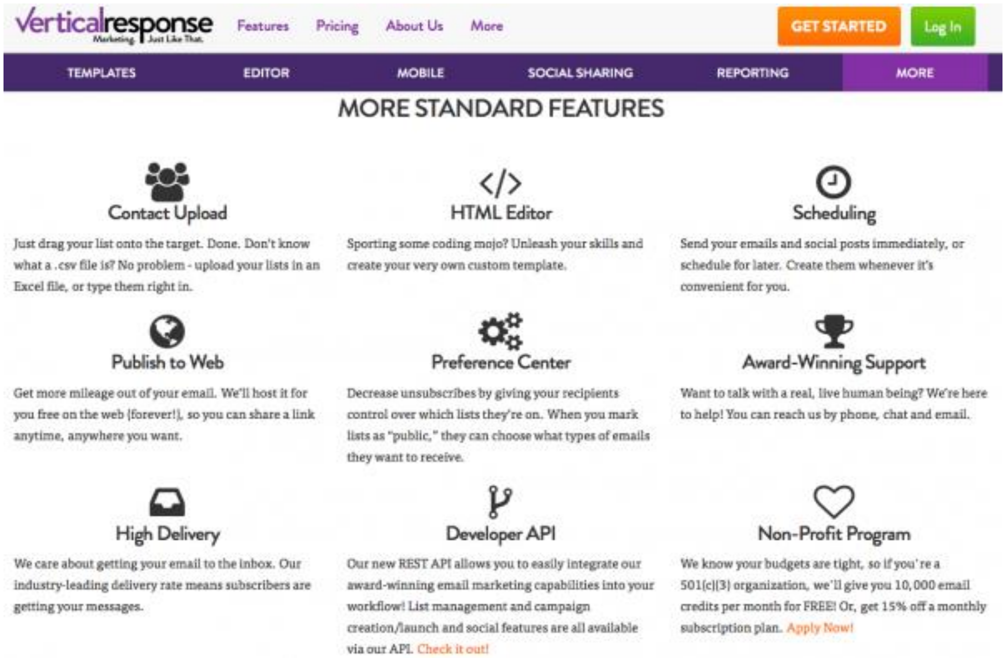
Click Through Rate

The click through rate is the percentage of impressions that resulted in a click to your site.

- This section tells you who links to your site and how. It's organized in basic categories like "Who links the most" and "Your most linked content." The more quality sites that link to yours, the better your Google ranking. If you're providing quality content, other sites will link to your content naturally.

c) Internal links

- To improve navigation on your site, you'll want to provide internal links. For instance, on this Vertical Response page "Check it out" and "Apply now" are two internal links that take customers to another spot within the website.



Remember

The more internal links that point to a page, the more Google assumes its significance.

- Internal links make it easier for people to surf your site and tell Google the importance of a page.

Manual Actions

- This tab is another way for Google to communicate with you. If there are any actions that you need to worry about, Google will let you know.

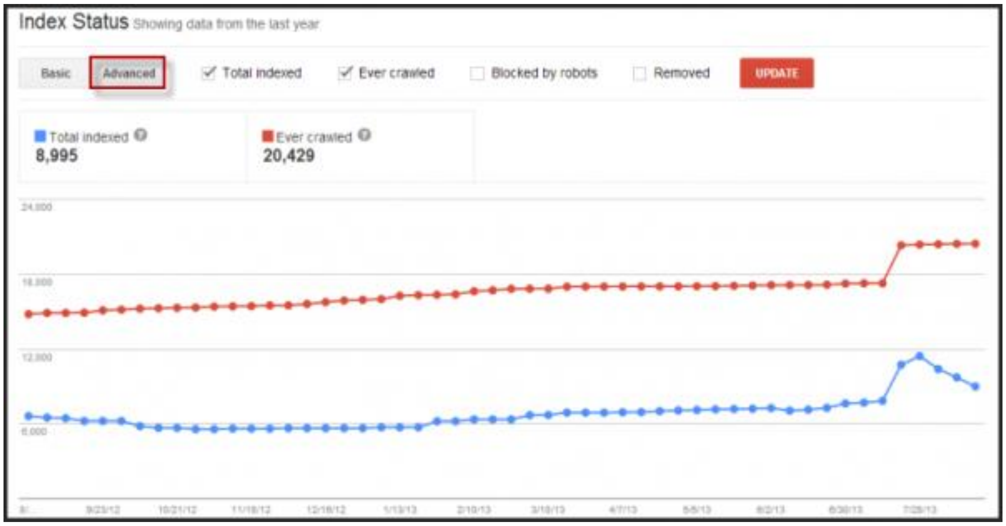
Google Index

a) Index status

- This tab shows you the total number of URLs that Google has recognized and will appear in search results. Google finds these URLs with a ton of computers that "crawl" through the Internet to look for new and updated pages online. Once a new page or an update is found, the Googlebot scans it for important information and indexes it so it can be found during a search.
- The index tab shows you the number of URLs the bot found. It tells you Google can find and index your site. A steady increase in the number of URLs is proof that Google can find your site and catalog the content on it. Here's a good example.

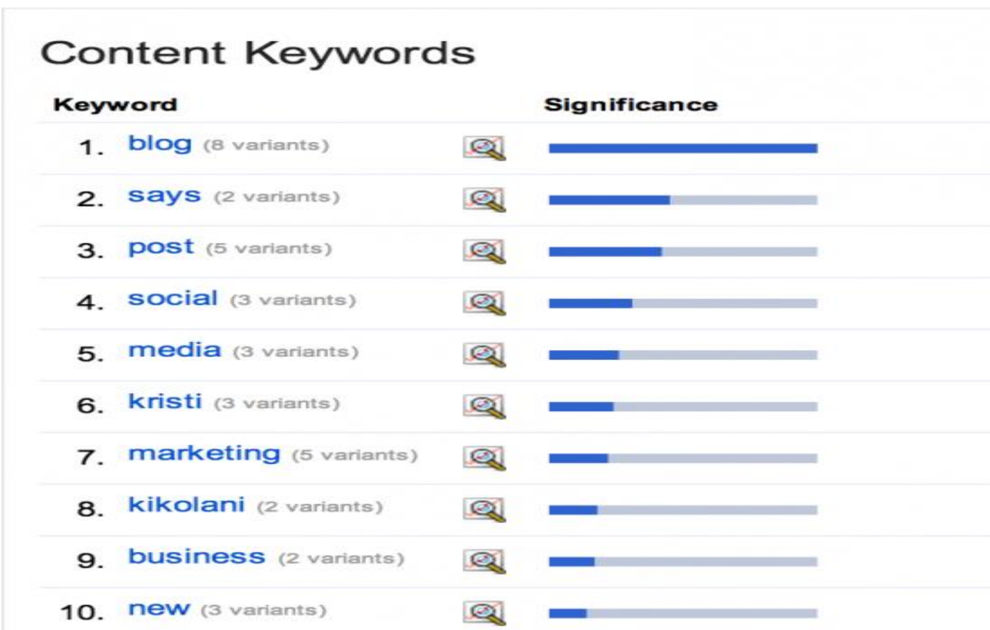
Remember

If you see dramatic increases or decreases in the graph you might have a problem with your server, or something is blocking Google from crawling your site.



b) Content Keywords

- This is a list of the most significant keywords that are used throughout your site.



- The keywords are listed in order of usage, with the most used keywords at the top. You can click on each word and see where it appears on your site. This information, along with the search queries information, can tell you how Google interprets your business site.

c) Remove URLs

- If Google has indexed a part of your website that contains confidential information, you can send a request to have that URL removed. This should only be used for emergency cases, like exposed confidential data.

Crawl

a) Crawl errors

- As the Googlebot crawls through your site, it will list any errors it finds with your site. Here's a look at a typical list of crawl errors.

Crawl errors

Issues Google encountered when crawling your site.

Web | Mobile CHTML | Mobile WML/XHTML

Show URLs: HTTP (1) | **Not found (78)** | Unreachable (1)

URL	Detail	Linked From	Detected
http://www.dollarshower.com/greys-anatomy-season-finale-2009-courtesy-google-trends-twitter-search/	404 (Not found)	3 pages	Jul 16, 2011
http://www.dollarshower.com/build-your-own-well-almost-wordpress-theme/	404 (Not found)	4 pages	Jul 16, 2011
http://www.dollarshower.com/?p=238	404 (Not found)	unavailable	Jul 14, 2011
http://www.dollarshower.com/?p=20	404 (Not found)	unavailable	Jul 13, 2011

Do you know!

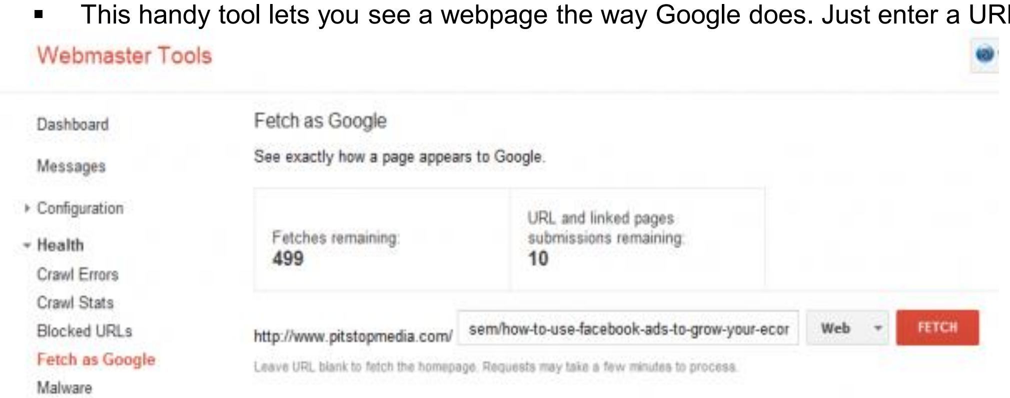
The most common error is a 404, which means the page can't be found. If you've redesigned your site or take down old content you might see this a lot If that's the case, send an email to the site manager and ask to have the link updated.

b) Crawl stats

- This shows you how often Google is crawling your site. You'll want to check this graph from time to time to make sure that Google is scanning through your content.

c) Fetch as Google

- This handy tool lets you see a webpage the way Google does. Just enter a URL and hit "Fetch."



Remember

If you think Google should be checking in more often, make sure you're updating content regularly and you'll keep the bot coming back for more.

- This option is particularly helpful if you're trying to troubleshoot issues with your page.

d) Blocked URLs

- If you have content on your site that you've blocked from Google on purpose, you'll see a list of those links here.

e) Sitemaps

- It deals with sitemap portion of your website.

f) URL parameters

- This section allows you dictate which URLs Google crawls.

g) Malware

- If your site has fallen victim to hackers, Google will let you know. You can also request a malware review from Google to make sure all infected areas are clear.

h) Security issues

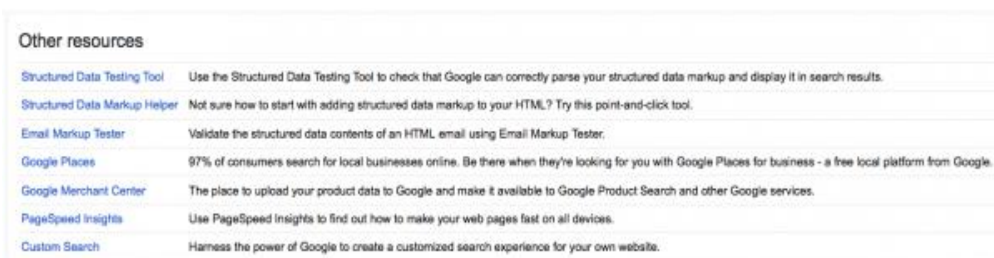
- This tab is another way for Google to get in touch with you should there be any security concerns. It's just another inbox-like feature that you should monitor.

Additional Tools

- You'll find some helpful resources in this section. Here are the most important and easy-to-use tools.

Remember

With URL parameter tab, if you enter the wrong URLs you can negatively affect your site. It's best to leave this one to the pros.



Other resources

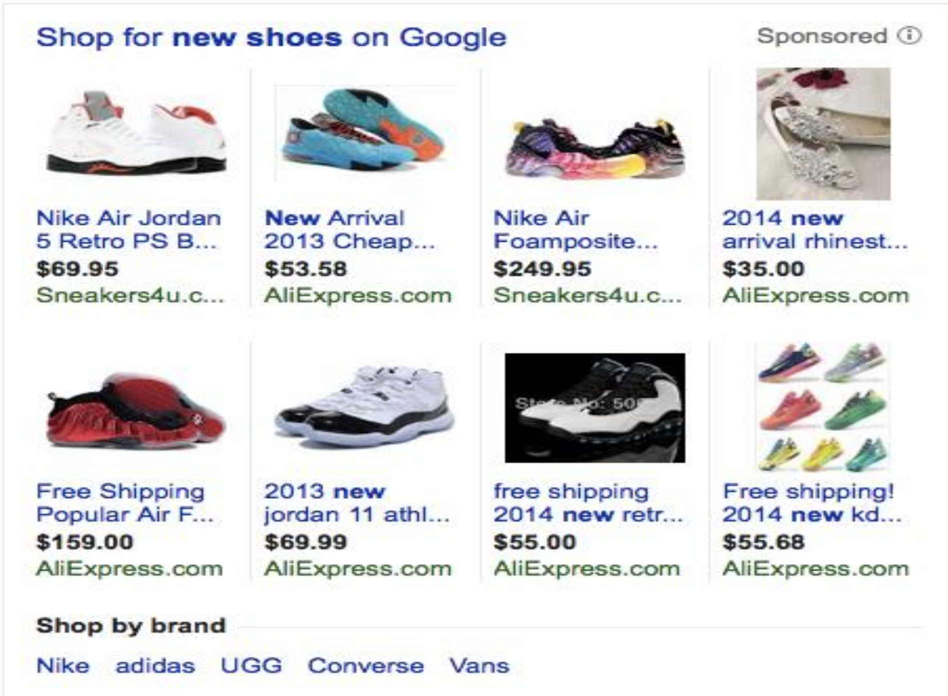
Structured Data Testing Tool	Use the Structured Data Testing Tool to check that Google can correctly parse your structured data markup and display it in search results.
Structured Data Markup Helper	Not sure how to start with adding structured data markup to your HTML? Try this point-and-click tool.
Email Markup Tester	Validate the structured data contents of an HTML email using Email Markup Tester.
Google Places	97% of consumers search for local businesses online. Be there when they're looking for you with Google Places for business - a free local platform from Google.
Google Merchant Center	The place to upload your product data to Google and make it available to Google Product Search and other Google services.
PageSpeed Insights	Use PageSpeed Insights to find out how to make your web pages fast on all devices.
Custom Search	Harness the power of Google to create a customized search experience for your own website.

Google Places

- You can add location of your business with this. A map with a pin showing your location will appear in search results.

Google Merchant Center

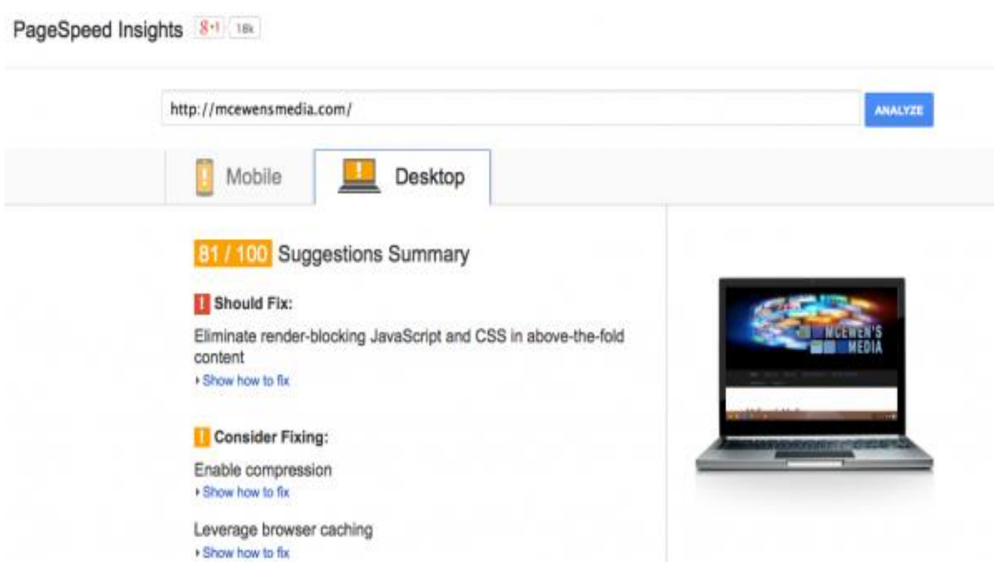
- When you Google "new shoes," a list of relevant links come up along with several pictures of products.



- With this you can improve the chances of your products showing up in these product listing ads. You'll be able to enter information about your product and improve your search ability.

Page Speed Insights

- Use the Page Speed Insights tab to see just how fast your page loads on both a desktop computer and a mobile device. Check out the report below.



- You'll get a rating. In this case, the desktop rating is 81/100. To improve the speed, it gives you a list of things you can change to make your page load faster.

Labs

Author stats

- It shows you what articles are getting read so you can adjust your topics accordingly.

Instant preview

- It also tells you if there are any errors as the bot works to preview the page.

Learner's Activity

Apply White Hat SEO Technique

Description: This activity consists of an interactive session in the class about importance of applying white hat SEO technique to make it search engine friendly.

Time Guideline: 30 Minutes.

Purpose: To be able to apply SEO Techniques.

Presentation:

1- Divide the class into groups of five

2- Brief the groups about the activity that each group will apply any white hat SEO technique.

3- Groups will perform this task.

4- Groups will demonstrate their work.

Learning Unit 2: Supply Chain Management (SCM)

Overview

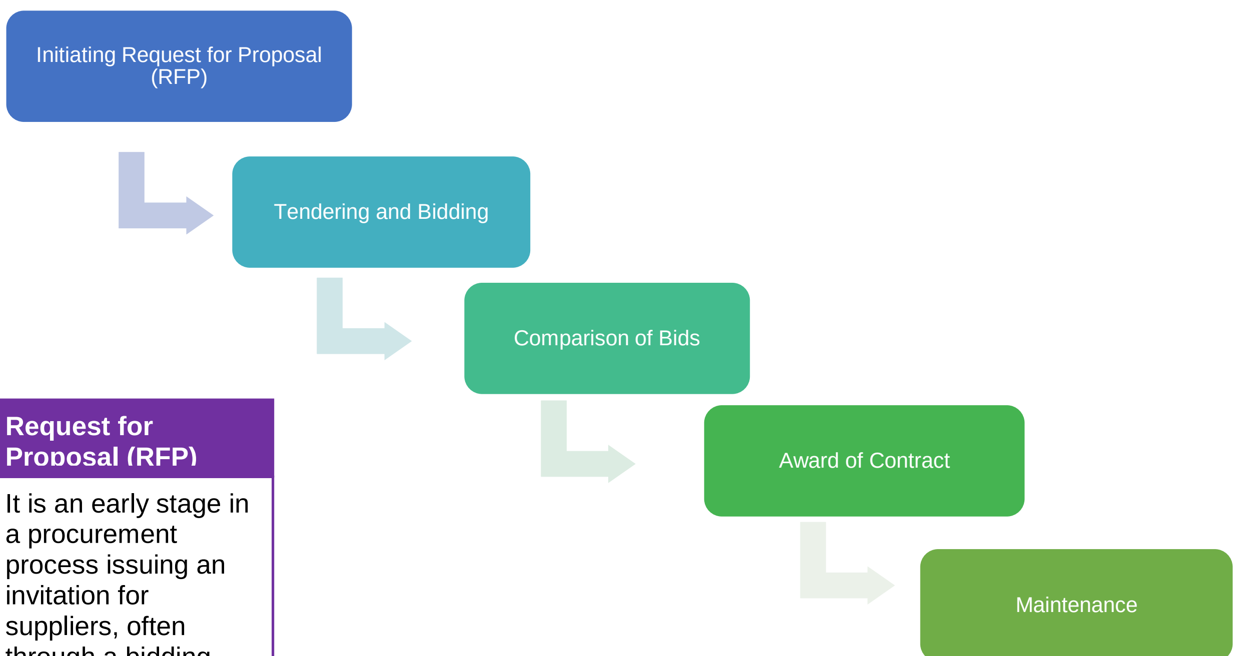
Procurement

It is the purchase of goods and services at the best possible price to meet a purchaser's demand in terms of quantity, quality, dimensions and site.

In this learning unit, you will be introduced to supply chain management concepts and principles. Also, some techniques and methods involved in supply chain management will be discussed. After completion of this learning unit, you will be able to demonstrate method of procuring goods including request for proposal, tendering, biding, comparative statement and award of contract. In addition, you will also be able to demonstrate the techniques of inventory control and reverse supply chain management.

1. Procurement Cycle

The Procurement cycle is the cyclical process of key steps which is used to procure goods or services. It starts from identification of a need through to the process of selecting the supplier, managing their performance and reviewing lessons learnt. A typical procurement cycle has been shown in the following illustration:



Request for Proposal (RFP)

It is an early stage in a procurement process issuing an invitation for suppliers, often through a bidding process, to submit a proposal on a specific commodity or service.

1. Initiating Request for Proposal (RFP)

At this stage of procurement process, invitation to suppliers is issued to request to submit proposal on a specific good or service. Newspaper or other media of advertisement is used to call proposals.

Request for Quotation (RFQ)

It is used when discussions with bidders are not required (mainly when the specifications of a product or service are already known) and when price is the main or only factor in selecting the successful bidder.

2. Tender and Bidding

Once the tenders are submitted, bids must be evaluated and validated in order to select the preferred supplier. At this stage most evaluations explore price comparisons alongside technical capability, capacity, quality of service and financial health. A post tender negotiation/ meeting often takes place, along with checking of references and credit checks or carrying out supplier visit, technical audit, product sampling or a trial.

3. Comparative Statement

After receiving tenders and bids, a comparative statement of potential suppliers/bidders is prepared. The comparative statement includes information about competing organizations on aspects such as technical, operational, financial and past experience in the relevant field. It helps business owners and managers in short listing the best supplier against the RFP. This document shows the quoted prices comparison, provided by the bidders to compete.

Do you know!

The agreed terms and conditions help to minimize contractual risks and exposure when doing business.

4. Award of Contract

Once the supplier has been selected, a contract is typically developed which allows both parties to fully understand their obligations and key success criteria as a part of the agreement. Once the contract and terms are agreed then the communication and implementation process can begin with clear timescales and parameters set out on both sides, including relevant stakeholder groups to manage the implementation effectively.

Remember

Developing a JIT approach requires sophisticated planning and considerable experience in this field.

5. Maintenance

In the procurement process, options for required maintenance services and works are assessed and appropriate procurement routes are identified.

2. Techniques to Manage Goods

Just-in-time

Just-In-Time (JIT) is a very simple idea but one that is essential in modern supply chain management. JIT sets out to cut costs by reducing the amount of goods and materials a firm holds in stock. JIT involves:

- producing and delivering finished goods ‘just in time’ to be sold
- partly finished goods ‘just in time’ to be assembled into finished goods
- Parts ‘just in time’ to go into partly finished goods

- Materials ‘just in time’ to be made into parts.

The principle that underpins JIT is that production should be ‘pulled through’ rather than ‘pushed through’. This means that production should be for specific customer orders, so that the production cycle starts only once a customer has placed an order with the producer. Stocks are delivered when they are needed. Consequently, this approach requires much more frequent delivery of stocks.

3. Track and Trace of the Product Delivery to Customer

At the time of placing orders the customer is provided with a token/ ticket automatically generated. This token/ ticket is used to track & trace the status of the parcel/ order.

Order Tracking enables a customer trace his/her orders. It is a common expectation in the logistics of parcel services (UPS and FedEx, for example). The supplier and customer can obtain real-time information on the position of shipments in the network that enable fast and dedicated interventions in case of any problem.

4. Incorporation of Outsourcing in Logistics

Outsourcing

A practice used by different companies to reduce costs by transferring portions of work to outside suppliers rather than completing it internally.

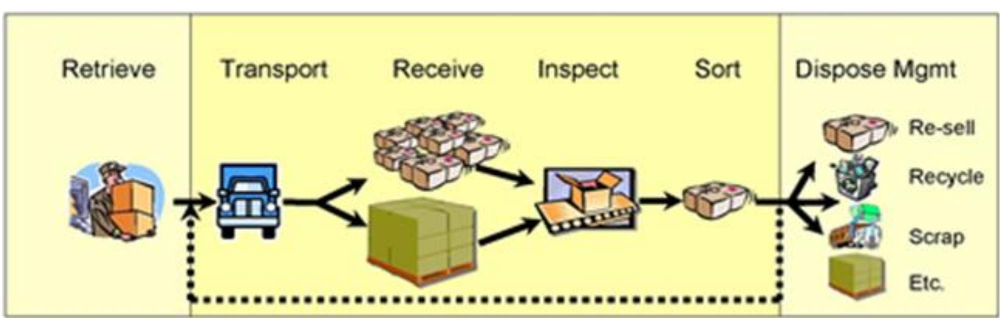
This includes not just the outsourcing of the procurement of materials and components, but also the outsourcing of services that traditionally have been provided in house. The logic of this trend is that the company will increasingly focus on those activities in the value chain in which it has a distinctive advantage and outsource everything else. This movement has been particularly evident in logistics, where the provision of transport, warehousing, and inventory control is increasingly subcontracted to specialists or logistics partners. Also, managing and controlling this network of partners and suppliers requires a blend of central and local involvement: strategic decisions are taken centrally, while the monitoring and control of supplier performance and day-to-day liaison with logistics partners are best managed locally.

5. Reverse Supply Chain Management

Reverse logistics is the process of managing the return of goods. It is also referred to as "aftermarket customer services". Any time money is taken from a company's warranty reserve or service logistics budget, one can speak of a reverse logistics operation.

Remember

Reverse logistics is more than just the reverse version of your forward supply chain.



Reverse logistics is also the process of managing the return of goods from store, which the returned goods are sent back to warehouse and after that either warehouse scrap the goods or send them back to supplier for replacement depending on the warranty of the merchandise.

6. EDI Methodologies and Formats

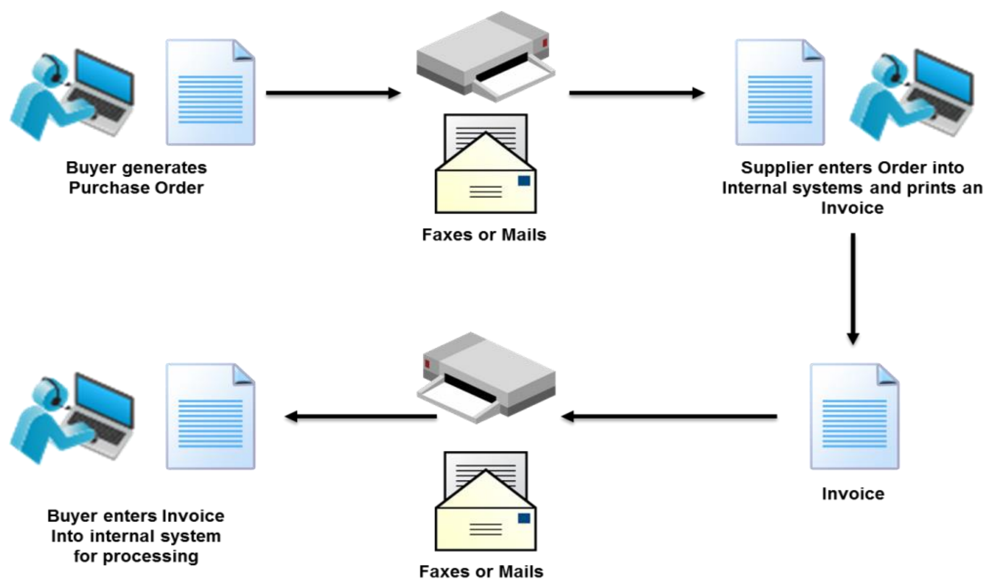
Electronic Data Interchange (**EDI**) is the computer-to-computer exchange of business documents in a standard electronic format between business partners.

By moving from a paper-based exchange of business document to one that is electronic, businesses enjoy major benefits such as reduced cost, increased processing speed, reduced errors and improved relationships with business partners.

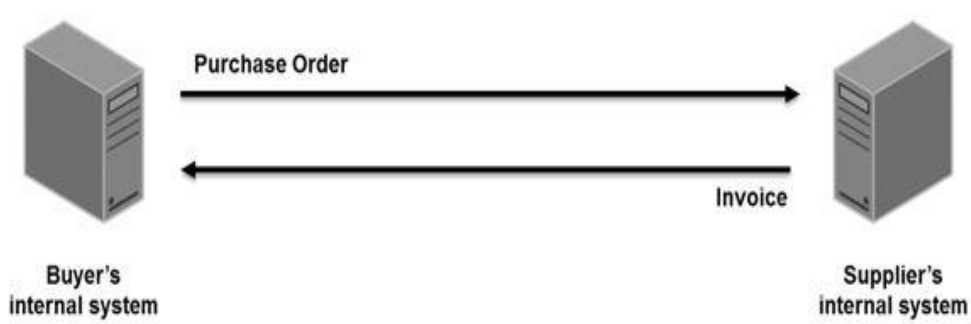
Methods

1. Computer-to-computer (peer to peer)

EDI replaces postal mail, fax and email. While email is also an electronic approach, the documents exchanged via email must still be handled by people rather than computers. Having people involved slows down the processing of the documents and also introduces errors. Instead, EDI documents can flow straight through to the appropriate application on the receiver's computer (e.g., the Order Management System) and processing can begin immediately. A typical manual process looks like this, with lots of paper and people involvement:



The EDI process looks like this …..No paper ………No people involved.



2. Value-added networks

To address the limitations in peer-to-peer adoption of EDI, VANs (value-added networks) were established. A VAN acts as a regional post office. It receives transactions, observes the 'from' and the 'to' information, and routes the transaction to the final recipient. VANs may provide a number of additional services, e.g. retransmitting documents, providing third party audit information, acting as a gateway for different transmission methods, and handling telecommunications support. Because of these and other services VANs provide, businesses frequently use a VAN even when both trading partners are using Internet-based protocols.

VANs may be operated by various entities:

- telecommunication companies;
- industry group consortia;
- A large company interacting with its suppliers/vendors.

3. Internet

As more organizations connected to the Internet, eventually most or all EDI was pushed onto it. Initially, this was through ad-hoc conventions, such as unencrypted FTP of ASCII text files to a certain folder on a certain host, permitted only from certain IP addresses.

Formats

Remember

Protocol is an agreed-upon format for transmitting data (set of rules) between two devices.

Because EDI documents must be processed by computers rather than humans, a standard format must be used so that the computer will be able to read and understand the documents. A standard format describes what each piece of information is and in what format (e.g., integer, decimal, mm/dd/yy). Without a standard format, each company would send documents using its company-specific format and, much as an English-speaking person probably doesn't understand Japanese, the receiver's computer system doesn't understand the company-specific format of the sender's format.

Learning Unit 3: Social Media Marketing

Overview

Social media marketing refers to the process of gaining traffic or attention through social media sites. On completion of this learning unit, you will be able to understand brand page creation on social networking sites like Facebook, integrating banner ads, regularly updating blogs, and direct marketing techniques like email and SMS marketing.

Social Media

These are websites and applications that enable users to create and share content or to participate in social networking.

1. Social Media Marketing

Social media marketing (SMM) is a form of Internet marketing that utilizes social networking websites as a marketing tool. The goal of SMM is to produce content that users will share with their social network to help a company increase brand exposure and broaden customer reach.

Remember

Federal Trade Commission (FTC) has its rules to include SMM.

SMM became more common with the increased popularity of websites such as Twitter, Facebook, Myspace, LinkedIn and YouTube. According to marketing aspects OLX, E-Bay, Amazon etc. are more popular.

2. Social Networking Sites

1. Facebook

Facebook is undoubtedly the most popular social media platform available with many advantages associated with it. It is primarily a social networking site, it lets you invite and connect with friends, send messages and pictures, like and comment or share them. However it can be used as a handy tool for promoting and advertising a business. We can use Facebook to promote a brand, market a company, or create awareness about a service or a product.

Do you know!

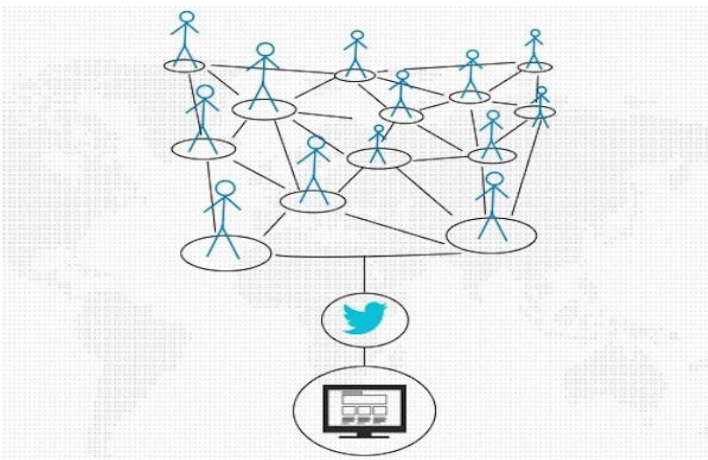
Facebook was founded by Harvard student Mark Zuckerberg on February 4, 2004.

2. Twitter

Twitter marketing is a powerful tool for companies of every size and structure to reach out to new customers, promote their brand, and connect with the rest of the companies. Users can find out if customers are talking about them, and the business can accordingly respond. Tweets create another instance for the business that shows up in the search engine results. Twitter serves as a solid foundation for your business to branch out into other social sites.

Tweet

Twitter users read and write 140-character messages called 'tweets'.



3. LinkedIn

Do you know!

On March 21, 2006, Jack Dorsey sent the first ever tweet – "just setting up my tweets".

LinkedIn is a professional networking platform and it has all the features of a great marketing opportunity provider. Here you interact with people who mean business. To market through LinkedIn, you need to do the following:

- Build a robust business page that displays your products and services in a compelling format.
- Invite clients and vendors to follow and recommend your page.
- Launch a group that is related to your business. It can attract significant traffic.

- Reach your audience through targeted advertising.

LinkedIn is a powerful social media tool. You just need to follow its policies and best practices.

4. Google +

Google+ is a social networking platform served by Google and relished by millions of users. Besides being a networking platform, it is a channel to make you known to search engines. Your presence on Google+ helps in improving your local search visibility. You can follow people in 'Circles' on Google+ for sharing information.

Brand Page

It is a profile on a social networking website which is considered distinct from an actual User profile in that it is created and managed by at least one other registered user as a representation of a non-personal online identity.

3. Brand Page Creation on Social Media Sites

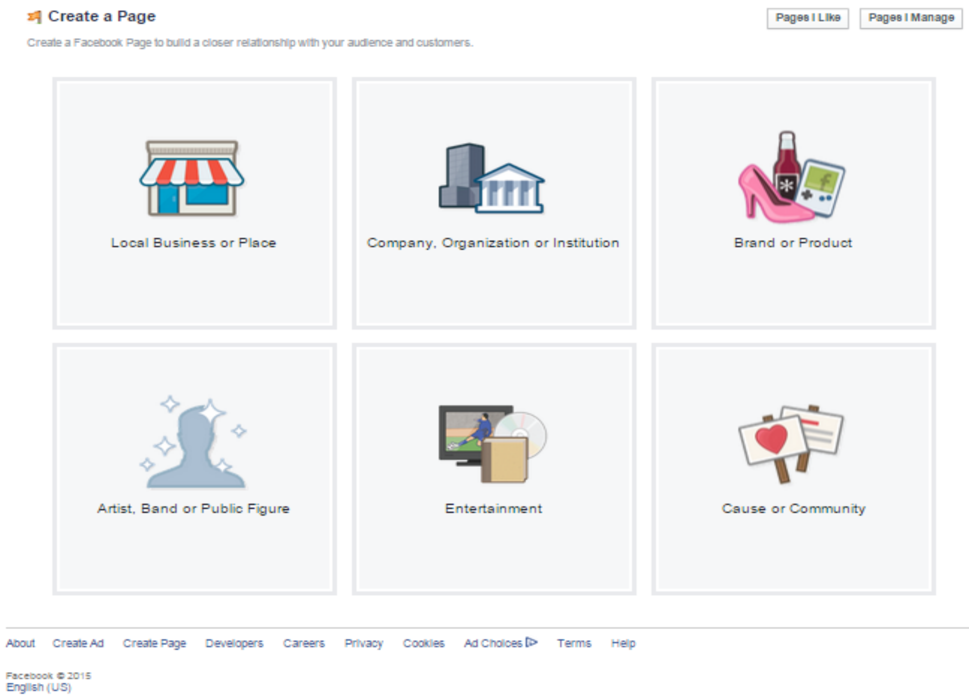
A brand page on Facebook can be created by following steps

1. Go to facebook.com/pages/create

2. Click to choose a Page category

Do you know!

"Activity" tab in your Page's top navigation can be checked to monitor how people are engaging with your Page and content.



3. Select a more specific category from the dropdown menu and fill out the required information

4. Click Get Started and follow the on-screen instructions

5. To understand the Admin Panel, in the top navigation, click "Settings." Sections would appear. Focus on three core :

- Page Info: This is where you can add additional details about your business.
- Notifications: This section allows you to customize when and how you'd like to receive Page alerts.
- Page Roles: Whether or not you'll be the main manager of the Page, there may be others at your organization that needs access to your Facebook Page. Here, you can invite other colleagues a public relations manager, a support, a designer.

6. Populate page with content. Basic content needed to get your Page kicking includes.

- Posts: Facebook currently provides posting options for Plain text status, Photo with caption, Link with caption, Video with caption, Event page and Location check-in

Do you know!

Some popular free banner design sites are Make Your Banner.com ABC Banners Atomic Arts.

- Cover Photo: This is the large, horizontal image that spans the top of your Facebook Page.

7. After adding content on the Page, users can be invited to like it.

8. Measure Your Growth by simply clicking the "Insights" option in the top navigation to see the Overview, Likes, Reach, Visits.

You have a Facebook business page. Now go post interesting content and amass a loyal base of Fans!

4. Familiarity with Banner Ads Integration

Banner ads is an image placed at the top or bottom of a web page of any website, to catch the viewer's eye and possibly prompt them to click on it. The purpose of banner advertising is to promote a brand and/or to get visitors from the host website to go to the advertiser's website.

The host is paid for the banner advertisement through one of three methods:

- Cost per impression (payment for every website visitor who sees the ad)
- Cost per click (payment for every website visitor who clicks on the ad and visits the advertiser's website)
- Cost per action (payment for every website visitor who clicks on the ad. goes to the advertiser's website and completes a task such as filling out a form or making a purchase).

Remember

Research suggests that people read only 16% of the words on the verage web page.

5. Skills to Update Brand/Product/Service Blogs

Blogging can help you to market you brand/product/service widely and effectively. The more people visiting your blog, the more sales you can make. You need to update your blog regularly to keep your readers coming back

1. Understand you customer

Clearly defining customer will give you the information you need to transform product-centric descriptions into customer-centric descriptions. Visualizing your buyer will empower you to make your descriptions more vivid, personal, and persuasive.

Blog

It is short for 'Web log'. A regularly updated web page, typically run by an individual or small group that is written in a formal or conversational style.

2. Create a Comprehensive List of Features and Benefits

List all of your features and specs, and then translate them into benefits. A feature is a fact about your product, while a benefit is an explanation of what that feature does for your reader. A benefit can be phrased as a positive (e.g., improves productivity) or as a problem that's avoided or reduced (e.g., decreases stress).

3. Understand Search Engine Optimization

A skilled blogger knows how to write blog posts with SEO in mind in order to get your blog noticed by search engines such as Google. SEO is critical to driving traffic to your blog.

6. Direct Marketing Techniques

Email

Email marketing is directly marketing a commercial message to a group of people using email. In its broadest sense, every email sent to a potential or current customer could be considered email marketing. It usually involves using email to send ads, request business, or solicit sales or donations, and is meant to build loyalty, trust, or brand awareness. Email marketing can be done to either sold lists or a current customer database. Broadly, the term is usually used to refer to sending email messages with the purpose of enhancing the relationship of a merchant with its current or previous customers, to encourage customer loyalty and repeat business, acquiring new customers or convincing current customers to purchase something immediately, and adding advertisements to email messages sent by other companies to their customers.

Do you know!

Madison Logic posted global data in April 2014 that claimed 122 billion emails are sent every hour.

Remember

90% of the population has cellular phones. Using the cell phones for advertising is highly useful.

SMS (Mobile-Commerce)

Text messaging allows businesses to reach individual customers and send messages to large groups of people at a low cost. You can use SMS messaging to send customers sales alerts, links to website updates, appointment or delivery reminders, or personalized messaging. On average, SMS messages are read within four minutes, making them highly convertible.

Learner's Activity

Description:	This activity consists of an interactive session in the class about direct marketing technique like email marketing.
Time Guideline:	30 Minutes.
Purpose:	To be able to apply direct marketing technique.

Presentation:

1- Divide the class into groups of five.

2- Brief the groups about the activity that each group will create an email marketing plan for some class event.

3- Groups will perform this task.

4- Groups will demonstrate their work.

Summary of Module

- E-marketing means using digital technologies to help selling your goods or services. These technologies are a valuable complement to traditional marketing methods whatever the size of your company or your business model.

- SEO methods (getting indexed, Preventing Crawling and Increasing prominence) are used for optimization purposes.

- Techniques such as (white hat, Black hat and Grey hat) are employed to get high ranking for your ecommerce site.

- Keywords play an important role in SEO campaigns because they guide search engine users to your website.

- Supply chain management covers the application of procurement, purchasing and supply, logistics, transport, and operations management.

- Brand pages are created on social networking sites, banner ads are integrated, blogs are updated and direct marketing techniques are used for social media marketing.

Frequently Asked Questions (FAQs)

FAQ 1:	What Search Engine Optimization Does?
Answer	Search engine optimization is a methodology of strategies, techniques and tactics used to increase the amount of visitors of your website.
FAQ 2:	Why do I want good Search Engine Optimization?
Answer	There are many reasons that you, as a web page designer or owner, want to have good Search Engine Optimization results. The main reason is to get people to come to your web page (good web traffic). If you have a counter (and I will put a link here on the page to get one) you can see how many people come to your page each day. If you check other popular sites, you may be able to see that they get a LOT of people there each day. The more people that come to your page, the more successful your site will be.
FAQ 3:	How can I improve my ratings on popular search engines?
Answer	Good Search Engine Optimization will help you get better ratings. One reasons for that is that sites that rate high on search engines get more clicks because people see them sooner. Also, if people like your page, they will link to it -- either on their page or on their "favorites" section of their browser. You don't have to fix everything at once, but if you work at it, you will improve your page.
FAQ 4:	In supply chain management how to track and trace the product delivery to customer
Answer	At the time of placing orders the customer is provided with a token/ ticket automatically generated. This token/ ticket is used to track & trace the status of the parcel/ order.
FAQ 5:	What are the methods of EDI
Answer	Generally EDI is implemented through the following three method 1. Computer to computer (Peer to Peer) 2. Value added Networks 3. Internet
FAQ 6:	How do I keep a high ranking in search engines?
Answer	It is possible to retain a high ranking, as long as you are aware of the factors that affect your ranking. If you know what search engines are looking for, it is easier to determine a plan of action. In particular, quality content is a very important factor in ranking. Google ranks content by what it thinks will be the most useful to searchers. Another thing that you should do is focus on local listings. These listings will help to strengthen your overall presence online. In a nutshell, the best way to rank right now is focus on your patients and what will be the most useful to them. Your patients need to know where to find you, what services you offer, and how those services are beneficial.
FAQ 7:	How does Google determine ranking of websites?
Answer	Google uses an algorithm to determine which results show up in search results. The algorithm is a set of programs and formulas that look for clues in the index to find content relevant to your search query. Currently, there are more than 200 of these signals, or clues, that the algorithm looks for to determine what results to show. So, every time you search for something on Google, the algorithm looks for these 200 clues to provide you with results. Amazingly enough, the algorithm can do all of that within 1/8 of a second!
FAQ 8:	Write a note on firebug.
Answer	Firebug is one of the most important SEO plugins for Firefox. It’s an invaluable part of search marketer’s toolkit.

FAQ 9:	Why Are White Hat SEO Techniques Important To You?
Answer	Not engaging in White Hat SEO can get your site banned from Google and other search engines!
FAQ 10:	What are the steps of procurement cycle?
Answer	Procurement Cycle has following steps • Launch of RFP/RFQ, • Tender, • Bidding, • Comparative Statement and • Award of Contract, Maintenance)
FAQ 11:	JIT stands for?
Answer	Just in time.
FAQ 12:	Define EDI?
Answer	EDI is an electronic way of transferring business documents in an organization internally between its various departments or externally with suppliers, customers or any subsidiaries etc.

Test Yourself!

Please mark the correct one from the given options. You can check your answer with the Answer Key at the end of this module.

1. SEO is to improve the volume and _________ to a website from search engines.

a. Look and Feel
b. Advertisement
c. Quality of traffic
d. None of these

2. _______ is the process of fetching all the web pages linked to a website.

a. Processing
b. Calculating Relevancy
c. Indexing
d. Crawling

3. Task of crawling is performed by a complex software which is called as ____________ .

a. Crawler
b. Spider
c. Bot
d. All of these.

4. Search engine optimization can be described as _______.

a. Paid for
b. Organic
c. Easy
d. All of these.

5. Black hat' SEO is ____________ .

a. SEO practiced by cowboys
b. The description given to practices which trick the search engines into presenting false results.
c. A term used to describe people who are bad at SEO.
d. The description given to the practice of developing the content of your website so that the search engines like it.

6. Why might deciding on your website's keyword yourself not be a good idea?

a. You're not an expert on SEO

b. You know nothing about your products

c. You don’t know what keywords searchers might use

d. You are too busy doing other things

7. Which one of the following practice is ethical?

a. Buying links from link farms

b. Having the same page twice in html, once in pdf.

c. Using hidden text that users don’t see but spiders can read

d. Stuffing the metatags with keywords

8. What is Page Rank?

a. The Alexa technology for ranking pages.

b. The way Yahoo! measures how popular a given page is based on the number and quality of sites that link to it.

c. The search relevancy of a page compared to the other pages in the search engine

d. The way Google measures how popular a given page is based on the number and quality of sites that link to it.

9. An important feature of supply chain management is its application of electronic commerce technology that allows companies to share and operate systems for:

a. Order processing, transportation scheduling, and inventory management.

b. cost-effective flowing of raw materials

c. future purchasing of computer systems

d. future merger opportunities

10. Which of the following is true for supply chain management?

a. The physical material moves in the direction of the end of chain

b. Flow of cash backwards through the chain

c. Exchange of information moves in both the direction

d. All of these.

Answer Key

MCQ Number	Correct Answer
1	c
2	d
3	d
4	b
5	b
6	c
7	a
8	d
9	a
10	d

Module 5: Legal and Ethical Aspects

Learning Outcomes

After completion of this learning module, you will be able to:

- Develop Code of Ethics and Professional Conduct
- Improve your Planning Capabilities
- Gain awareness to provision of applicable territorial Taxation / Business / Employment Rights for duties & rights at workplace

Learning Unit 1: Ethics and Professional Conduct

Overview

Code of Ethics and Professional Conduct describes the expectations that we have of ourselves and our fellow workers in the workplace. It expresses the ideals to which we aspire as well as the behaviors that are mandatory in our professional roles. On completion of this learning module you will be able to understand the concepts of responsibility, respect, fairness and honesty at workplace.

1. Responsibility

Description of Responsibility

Responsibility is our duty to take ownership for the decisions we make or fail to make, the actions we take or fail to take, and the consequences that result.

Remember

In case of a contracting arrangement, only bid on work that organization is qualified to perform and assign only qualified individuals to perform the work.

Responsibility: Aspirational Standards

As professionals in the workplace:

1. We make decisions and take actions based on the best interests of society, public safety, and the environment.
2. We accept only those assignments that are consistent with our background, experience, skills, and qualifications.
3. We fulfill the commitments that we undertake – we do what we say we will do.
4. When we make errors or omissions, we take ownership and make corrections promptly. When we discover errors or omissions caused by others, we communicate them to the appropriate body as soon they are discovered. We accept accountability for any issues resulting from our errors or omissions and any resulting consequences.
5. We protect proprietary or confidential information that has been entrusted to us.
6. We uphold this Code and hold each other accountable to it.

Responsibility: Mandatory Standards

As professionals in the workplace, we require the following of ourselves and our fellow workers:

Regulations and Legal Requirements

1. We inform ourselves and uphold the policies, rules, regulations and laws that govern our work, professional, and volunteer activities.
2. We report unethical or illegal conduct to appropriate management and, if necessary, to those affected by the conduct.

Ethics Complaints

1. We bring violations of this Code to the attention of the appropriate body for resolution.
2. We only file ethics complaints when they are substantiated by facts.
3. We pursue disciplinary action against an individual who retaliates against a person raising ethics concerns.

2. Respect

Description of Respect

It is our duty to show a high regard for ourselves, others, and the resources entrusted to us. Resources entrusted to us may include people, money, reputation, company profile, tangible assets (equipment's), the safety of others, and natural or environmental resources. An environment of respect engenders trust, confidence, and performance excellence by fostering mutual cooperation—an environment where diverse perspectives and views are encouraged and valued.

Respect: Aspirational Standards

As professionals in the workplace:

1. We inform ourselves about the norms and customs of others and avoid engaging in behaviors they might consider disrespectful.
2. We listen to others' points of view, seeking to understand them.
3. We approach directly those persons with whom we have a conflict or disagreement.
4. We conduct ourselves in a professional manner, even when it is not reciprocated.

Respect: Mandatory Standards

As professionals in the workplace, we require the following of ourselves and our fellow workers:

Abusive Manner
Conduct that results in physical harm or creates intense feelings of fear, humiliation, manipulation, or exploitation in another person.

1. We negotiate in good faith.
2. We do not exercise the power of our expertise or position to influence the decisions or actions of others in order to benefit personally at their expense.
3. We do not act in an abusive manner toward others.
4. We respect the property rights of others.

3. Fairness

Description of Fairness

Fairness is our duty to make decisions and act impartially and objectively. Our conduct must be free from competing self-interest, prejudice, and favouritism.

Fairness: Aspirational Standards

As professionals in the workplace:

1. We demonstrate transparency in our decision-making process.
2. We constantly re-examine our impartiality and objectivity, taking corrective action as appropriate.
3. We provide equal access to information to those who are authorized to have that information.
4. We make opportunities equally available to qualified candidates.

Fairness: Mandatory Standards

As professionals in the workplace, we require the following of ourselves and our fellow workers:

Remember

A conflict of interest occurs when we are in a position to influence decisions on behalf of one party when such decisions or outcomes could affect other parties with which we have competing loyalties.

Conflict of Interest Situations

1. We proactively and fully disclose any real or potential conflicts of interest to the appropriate stakeholders.
2. When we realize that we have a real or potential conflict of interest, we refrain from engaging in the decision making process or otherwise attempting to influence outcomes, unless or until: we have made full disclosure to the affected stakeholders; we have an approved mitigation plan; and we have obtained the consent of the stakeholders to proceed.

Favouritism and Discrimination

1. We do not hire or fire, reward or punish, or award or deny contracts based on personal considerations, including but not limited to, favouritism, nepotism, or bribery.
2. We do not discriminate against others based on, but not limited to, gender, race, age, religion, disability, nationality, or sexual orientation.
3. We apply the rules of the organization (employer, Project Management Institute, or other group) without favouritism or prejudice.

4. Honesty

Description of Honesty

Honesty is our duty to understand the truth and act in a truthful manner both in our communications and in our conduct.

Honesty: Aspirational Standards

As professionals in the workplace:

1. We earnestly seek to understand the truth.
2. We are truthful in our communications and in our conduct.
3. We provide accurate information in a timely manner.

a. We make commitments and promises, implied or explicit, in good faith.

b. We strive to create an environment in which others feel safe to tell the truth.

Honesty: Mandatory Standards

As professionals in the workplace, we require the following of ourselves and our fellow workers:

1. We do not engage in or condone behavior that is designed to deceive others, including but not limited to, making misleading or false statements, stating half-truths, providing information out of context or withholding information that, if known, would render our statements as misleading or incomplete.

2. We do not engage in dishonest behavior with the intention of personal gain or at the expense of another.

Learner's Activity

Role play on responsibility in workplace

Description:	This activity consists of role play in the class about duty to take Ownership for the decisions/actions s/he makes or fails to make and their consequences in workplace.
Time Guideline:	30 Minutes.
Purpose:	To be able to develop sense of responsibility at workplace.
Presentation:	1- Call two volunteers from the class one who will act as employer and other as employee. 2- Brief them about role play that employee will confess about a decision who he made and resulted in a loss to company and he has planned to make it right. 3- Learners will perform the role play. 4- Discussion will be made what learners learnt from this role play.

Learning Unit 2: Planning of Business Process Activities

Overview

Planning activities play an important part in business process. On completion of this learning unit, you will be able to understand how you can provide assistance to an in-line manager, identify tasks, schedule them, define milestones and learn optimal utilization of resources.

1. Provide due Assistance to In-Line Manager

Assist to Coordinate Recurring Meetings

We can assist a manger in coordinating recurring meetings by performing following tasks.

1. Helping manger scheduling the meeting.
2. Organizing meeting venue.
3. Communicating the members to inform them about the meeting.
4. Preparing agenda and any other supporting documentation (e.g. reports, handouts and spreadsheets).
5. Briefing manager about the status of the meeting.

Intimate Resource Availability

We can create a resource availability output for managers which describes the time frame in which resources (both human and material) are available. This helps managers estimate the types of resources they might need for project. For example if they are working on a project that requires the use of specialized equipment during one of the project phases and the resource availability document shows that this equipment is not available until sometime after the time frame in which they need it, they know they will need to either make schedule adjustments or find another supplier who can provide the equipment when they need it. The same is true for human resources.

Create And Keep Documentations

A common need among businesses is the ability to describe their processes in a way that their stakeholders will quickly understand. The primary tool for describing business processes is the business process documentation. Since no standard exists, a business process documentation can be developed that meets the needs of each particular organization.

Validate Applicable Company Defined Standards

Virtually all companies possess service standards and measures that are company defined. We should provide assistance to manger to validate the applicable company defined standards that are established to reach internal company goals for productivity, efficiency, cost, or technical quality.

2. Define Activities

Defining activities by applying specific life cycle methodologies like requirement gathering, designing solutions, testing and documentations etc.

Requirements gathering

Requirements gathering is an essential part of any life cycle methodology. Understanding fully what a project will deliver is critical to its success. Requirement gathering processes are the stakeholder meetings or interviews.

> **Remember**
>
> During requirement gathering, don't assume you know what the customer wants, ask.

Design solution

The design stage takes as its initial input the requirements identified in the approved requirements document and gathered during the first phase. For each requirement, a set of one or more design elements will be produced.

Prototype

A prototype which is a draft version of a product that allows you to explore your ideas and shows the intention behind a feature or the overall design concept can be created before investing time and money into development. A prototype can be anything from paper drawings to something that allows click-through of a few pieces of content to a fully functioning site.

Testing

Testing provides information about the product, and it is the first feedback to the developers. Testing helps people (the developers, the testers, the managers, the customers) understand what the product does and how well it does it.

> **Do you know!**
>
> Project documentation is used to define the way we manage projects and the governance surrounding them.

Documentations

Every step in the project is documented for future reference and for the improvement of the system in the development process. The design documentation may include writing the application programming interface (API)

3. Estimate Time for an Activity

The aim of effective project management is to bring the project to completion on time and on schedule. Estimating project duration is a key function of scheduling. Individual activities make up the schedule, and the estimates of their duration determine the project timetable. The accuracy of the overall schedule depends on the accuracy of these estimates. While project managers can't know the actual time it will take to complete an activity, there are six methods they can use to obtain reliable estimates.

1. Work Breakdown

A work breakdown technique to reduce the activity to smaller tasks and estimate the duration of tasks that individual workers perform more accurately than the whole activity.

2. Historical

An effective way of estimating activity duration is to use historical data. If data on the duration of the same activities is available, project managers take the average duration of the historical records and use that in the project schedule.

3. Analogy

Use of analogous activities can generate reliable estimates.

4. Expert Judgment

Expert judgment means using specialists who have a reputation for knowledge of the particular field and experience in estimating activity duration within it.

5. Effort

A project manager who knows what resources are necessary for an activity may calculate the effort the activity requires and arrive at a duration. He adds the amount of time it takes to obtain materials to the labor time it takes to complete the tasks.

6. Units

Calculation based on units of activity is a method available to both the largest and smallest businesses. Typical units are numbers of products or size of the product. Project managers can calculate how much time it took to produce a certain number or a certain size and adjust for the number or size they want to produce.

4. Achieve Work Breakdowns

Dividing complex projects to simpler and manageable tasks is the process identified as Work Breakdown Structure (WBS).

Usually, the project managers use this method for simplifying the project execution. In WBS, much larger tasks are broken down to manageable chunks of work. These chunks can be easily supervised and estimated. E.g. testing a product may have components like interface, performance, and test cases.

WBS is not restricted to a specific field when it comes to application. This methodology can be used for any type of project management.

Following are a few reasons for creating a WBS in a project:

1. Accurate and readable project organization.
2. Accurate assignment of responsibilities to the project team.
3. Indicates the project milestones and control points.
4. Helps to estimate the cost, time and risk.
5. Illustrate the project scope, so the stakeholders can have a better understanding of the same.

5. Resource Levelling Due to Work Load

Resource leveling is a "technique in which start and finish dates are adjusted based on resource constraints with the goal of balancing demand for resources with the available supply".

When performing project planning activities, the manager will attempt to schedule certain tasks simultaneously. When more resources such as machines or people are needed than are available, or perhaps a specific person is needed in both tasks, the tasks will have to be rescheduled concurrently or even sequentially to manage the constraint. Project planning resource leveling is the process of resolving these conflicts. It can also be used to balance the workload of primary resources over the course of the project[s], usually at the expense of one of the traditional triple constraints (time, cost, scope).

Learning Unit 3: Awareness to Rights

Overview

Raising awareness to workplace rights is very important. On completion of this learning unit, you will be able understand the importance of informing ourselves and upholding workplace policies, rules/regulations, reporting an illegal conduct at workplace, and protecting proprietary or confidential information,

1. Inform Ourselves and Uphold the Workplace Policies

Whistleblower

A whistleblower is a person who raises a concern about a wrongdoing in their workplace

Company policies are written statements of the company's standards and objectives and include all areas of employment, including recruitment, compensation, termination, benefits, employee relations and leaves of absence. They contain rules on how employees must perform their jobs and interact with each other. Managers, employees and the HR department all have roles in ensuring that these policies are effectively implemented.

We should inform ourselves and uphold these policies, rules, regulations and laws that govern our work, professional, and volunteer activities. These rules, regulation and policies protect business and workers and if correctly implemented and executed, create and maintain a better work environment for all.

2. Report Illegal Conduct to Appropriate Management

Do you know!

It is unlawful to terminate any employee who reports, complains about, or opposes illegal or fraudulent conduct by an employer or co-workers.

It is the responsibility of the employee to report unethical or illegal conduct to appropriate management and if necessary to those affected by the conduct. If he sees any illegal behavior including but not limited to theft, fraud, corruption, embezzlement or bribery. Furthermore someone taking or abusing the property of others including intellectual property.

As professionals and representatives of our profession, we do not condone or assist others in engaging in illegal behavior. We report any illegal or unethical conduct. Reporting is not easy and we recognize that it may have negative consequences. Since recent corporate scandals, many organizations have adopted policies to protect employees who reveal the truth about illegal or unethical activities. Some governments have also adopted legislation to protect employees who come forward with the truth.

3. Protect Proprietary or Confidential Information

Remember

Violation of intellectual property rights, called "infringement" with respect to patents, copyright, and trademarks, and "misappropriation" with respect to trade secrets, may be a breach of civil law or criminal law.

1. Intellectual Property Rights

A right that is had by a person or by a company to have exclusive rights to use its own plans, ideas, or other intangible assets without the worry of competition, at least for a specific period of time. These rights can include copyrights, patents, trademarks, and trade secrets. These rights may be enforced by a court via a lawsuit. The reasoning for intellectual property is to encourage innovation without the fear that a competitor will steal the idea and / or take the credit for it.

Patents

A patent is a form of right granted by the government to an inventor, giving the owner the right to exclude others from making, using, selling, offering to sell, and importing an invention for a limited period of time, in exchange for the public disclosure of the invention. An invention is a solution to a specific technological problem, which may be a product or a process and generally has to fulfil three main requirements: it has to be new, not obvious and there needs to be an industrial applicability.

Trademark

A trademark is a recognizable sign, design or expression which distinguishes products or services of a particular trader from the similar products or services of other traders.

Trade secrets

A trade secret is a formula, practice, process, design, instrument, pattern, or compilation of information which is not generally known or reasonably ascertainable, by which a business can obtain an economic advantage over competitors or customers.

Do you know!

The term of the patent, which is the maximum period during which it can be maintained in force, is 20 years from the earliest filing date of the application on which the patent was granted.

2. Copy Rights

Copyright is a form of intellectual property. Legal monopoly that protects published or unpublished original work (for the duration of its author's life plus 50 years) from unauthorized duplication without due credit and compensation. Copyright covers not only books but also advertisements, articles, graphic designs, labels, letters (including emails), lyrics, maps, musical compositions, product designs, etc. According to the major international intellectual-property protection treaties (Berne Convention, Universal Copyright Convention, and WIPO Copyright Treaty) five rights are associated with a copyright:

The right to:

1. Reproduce the work in any form, language, or medium.
2. Adapt or derive more works from it.
3. Make and distribute its copies.
4. Perform it in public.
5. Display or exhibit it in public.

To acquire a valid copyright, a work must have originality and some degree of creativity. However, what is protected under copyright is the 'expression' or 'example' of an idea, and not the idea itself. A copyright is not equivalent of legal-prohibition of plagiarism (which is an unethical and unprofessional conduct, but not an offense), and does not apply to factual information.

Consumer

A consumer is defined as someone who acquires goods or services for direct use or ownership rather than for resale or use in production and manufacturing.

3. Consumer Protection

Consumer protection is a group of laws and organizations designed to ensure the rights of consumers as well as fair trade, competition and accurate information in the marketplace. The laws are designed to prevent businesses that engage in fraud or specified unfair practices from gaining an advantage over competitors. They may also provide additional protection for those most vulnerable in society. Consumer protection laws are a form of government regulation, which aim to protect the rights of consumers.

For example, a government may require businesses to disclose detailed information about products—particularly in areas where safety or public health is an issue, such as food. Consumer protection is linked to the idea of consumer rights, and to the formation of consumer organizations, which help consumers make better choices in the marketplace and get help with consumer complaints.

Do you know!

The first Consumer Protection Law was prepared and approved by the late Iqbal Haider, who was the Law Minister at that time, introduced the first Consumer Protection Law in Islamabad.

4. Data Protection Act

The Data Protection Act controls how your personal information is used by organizations, businesses or the government. Everyone responsible for using data has to follow strict rules called ‘Data Protection Principles’. They must make sure the information is:

- Used fairly and lawfully.
- Used for limited, specifically stated purposes.
- Used in a way that is adequate, relevant and not excessive.
- Accurate.
- Kept for no longer than is absolutely necessary.
- Handled according to people’s data protection rights.
- Kept safe and secure.
- Not transferred outside the country without adequate protection.

There is stronger legal protection for more sensitive information, such as:

- Ethnic background.
- Political opinions.
- Religious beliefs.
- Health.
- Sexual health.
- Criminal records.

Summary of Module

- Code of Ethics and Professional Conduct includes both aspirational standards and mandatory standards for the values which are defined as most important like responsibility, respect, fairness, and honesty against the applicable territorial laws.

- A worker can assist a manger in routine workplace activities like coordinating meeting, defining activities by applying life cycle methodologies, estimating time for activities, achieving work breakdowns and performing resource leveling.

- It is necessary to inform ourselves and uphold the policies, rules and regulations that govern workplace. An employee should report illegal conduct or illegitimate action to appropriate management. Protect proprietary confidential information.

Frequently Asked Questions (FAQs)

FAQ 1:	Define Abusive manner in code of ethics and professional conduct?
Answer	Conduct that results in physical harm or creates intense feelings of fear, humiliation, manipulation, or exploitation in another person.
FAQ 2:	Define Prototype in life cycle methodology?
Answer	A prototype which is a draft version of a product that allows you to explore your ideas and show the intention behind a feature or the overall design concept can be created before investing time and money into development.
FAQ 3:	Define Copyright?
Answer	Legal monopoly that protects published or unpublished original work (for the duration of its author's life plus 50 years) from unauthorized duplication without due credit and compensation.
FAQ 4:	Define a whistleblower?
Answer	A whistleblower is a person who raises a concern about a wrongdoing in their workplace
FAQ 5:	Differentiate between infringement and misappropriation?
Answer	Violation of intellectual property rights, called "infringement" with respect to patents, copyright, and trademarks, and "misappropriation" with respect to trade secrets.
FAQ 6:	What is Patent?
Answer	A patent is a form of right granted by the government to an inventor, giving the owner the right to exclude others from making, using, selling, offering to sell, and importing an invention for a limited period of time, in exchange for the public disclosure of the invention.
FAQ 7:	Define Trademark?
Answer	A trademark is a recognizable sign, design or expression which distinguishes products or services of a particular trader from the similar products or services of other traders.
FAQ 8:	What Cannot Be Protected by a Trademark?
Answer	The general answer is that if something is protected by a copyright or a patent it is generally not protectable by trademark law. However, this is not always the case. Sometimes there is overlap between trademarks, copyrights, and patents. But, as a general rule trademarks are source identifiers that protect goods and services, while copyrights protect works of authorship and patents protect inventions.

FAQ 9:	How is a copyright different from a patent or a trademark?
Answer	Copyright protects original works of authorship, while a patent protects inventions or discoveries. Ideas and discoveries are not protected by the copyright law, although the way in which they are expressed may be. A trademark protects words, phrases, symbols, or designs identifying the source of the goods or services of one party and distinguishing them from those of others.
FAQ 10:	Who can blow the whistle?
Answer	Employees, applicants for employment, students, patients, vendors, contractors, and the general public can blow the whistle.

Test Yourself!

Please mark the correct one from the given options. You can check your answer with the Answer Key at the end of this module.

1. Codes of ethics and professional conduct:

a. Are always externally audited.

b. Create guidelines for employees to work by.

c. Are always compliance based.

d. Are always integrity based.

2. Patent law protects:

a. Inventions that feature some sort of utility function.

b. Designs of a manufactured good.

c. Plants that may be reproduced through seeds.

d. Both A and B are correct.

3. What is whistle blowing?

a. Warning colleagues of threats from unethical dealers, investors and the like

b. Announcing a high standard of ethical behaviour to persuade outsiders of the benefits of dealing with an organisation

c. Spreading malicious rumours about managers not behaving ethically

d. Revealing unethical behaviour to superiors or outsiders

4. What is the term of a patent?

a. 35 years

b. 25 years

c. 20 years(Missed)

d. Unlimited

5. A whistle-blowing is expressly claimed to benefit:

a. The public

b. A company

c. Only the whistle-blower

d. The law

6. What is copyright meant for?

a. Film works

b. Books

c. Essays

d. All the above

7. You can infringe a patent by:

a. Making a product for your own personal use.

b. Making different products to the invention in order to research their technical effectiveness.

c. Selling the main components of the product, together with instructions how to assemble it using commonly available fastening components such as nuts, bolts, cable-ties and so on.

d. Publishing drawings of the product on your website.

8. Which of the following is not a type of copyright work?

a. Literary works

b. Furniture

c. Sculpture

d. Musical works

9. The Data Protection Act 1998:

a. Permits disclosure of sensitive personal data (without consent) if this is necessary to protect the health of a third party

b. Permits disclosure to close family members

c. Includes seven principles of data protection

d. Permits disclosure of sensitive personal data for research, teaching and audit purposes

10. The Data Protection Act 1998:

a. Permits patients to access their personal data that has been processed by a data controller

b. Provides patients with a right to access their personal health records.

c. Provides that personal data must be processed fairly and lawfully

d. All of the options are correct

Answer Key

MCQ Number	Correct Answer
1	b
2	d
3	d
4	c
5	a
6	d
7	c
8	b
9	a
10	d

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