SOFTWARE FUNDAMENTALS

- **Software**
  - **Software** is a collection of programs.

    OR

    Software is a collection of instructions that enable the user to interact with a computer, its hardware, or perform tasks.

    OR

    Software refers to a set of computer programs, procedure and associated documents describing the programs and how they are to be used.

  - Without software, most computers would be useless.

  - For example, without your Internet browser software, you could not surf the Internet or read this page and without an operating system, the browser could not run on your computer.

  - The picture to the right shows a Microsoft Excel box, an example of a spreadsheet software program.

  - Software package is a group of programs that solve a specific problem or perform a specific type of job. For example, word processing package may contain programs for text editing, formatting, drawing, graphics, spell check etc.

  - **Hardware** refers to the physical device of a computer system.

- **Relationship between Hardware and software**

- Both hardware and software are necessary for a computer to do useful job. They are complementary to each other
- Same hardware can be loaded with different software to make a computer system perform different types of jobs
- Except for *upgrades*, hardware is normally a one-time expense, whereas software is a continuing expense
- Upgrades refer to renewing or changing components like increasing the main memory, or hard disk capacities, or adding speakers, modems, etc.

  o In order for a computer to produce useful output, its hardware & software must work together.
  o Nothing useful can be done with the computer hardware on its own & software can't be utilized without supporting hardware.
  o So, there is a close connection between software & hardware.
  o Some points regarding this are as follows:
    - Both hardware & software are necessary for a computer to do useful job.
    - Both are complementary to each other.
    - The same hardware can be loaded with different software to make a computer system perform different types of job, just as different songs can be played using the same cassette player.

- **Software Types**
  o Software can be categorized according to what it is designed to accomplish.
  o There are two main types of software: **systems software and application software.**

    - **System software:** System software is a type of computer program that is designed to run a computer's hardware and application programs.
    - If we think of the computer system as a layered model, the system software is the interface between the hardware and user applications.

- The <u>operating system</u> (OS) is the best-known example of system software. The OS manages all the other programs in a computer.
- Make the operation of a computer system more effective and efficient
- Help hardware components work together and provide support for the development and execution of application software.
- Programs included in a system software package are called system program and the programs who prepare them are called system programmers.

- The <u>BIOS</u> (basic input/output system) gets the computer system started after you turn it on and manages the data flow between the operating system and attached devices such as the hard disk, video adapter, keyboard, mouse, and printer.
- The <u>boot program</u> loads the operating system into the computer's main memory or random access memory (RAM).
- An <u>assembler</u> takes basic computer instructions and converts them into a pattern of bits that the computer's processor can use to perform its basic operations.
- Other examples of system software are operating system, programming language, translator, utility programs and communication software.

- **Application software:** Application software is a set of one or more programs, which solves a specific problem, or does a specific task.
- Application software is a program or group of programs designed for end users.
- Application software resides above system software and includes applications such as database programs, word processors and spreadsheets.
- Application software may be grouped along with system software or published alone.
- Different types of application software include:

- **Application Suite**: Has multiple applications bundled together. Related functions, features and user interfaces interact with each other.
- Enterprise Software: Addresses an organization's needs and data flow in a huge distributed environment
- **Enterprise Infrastructure Software**: Provides capabilities required to support enterprise software systems
- **Information Worker Software:** Addresses individual needs required to manage and create information for individual projects within departments
- **Content Access Software:** Used to access content and addresses a desire for published digital content and entertainment
- **Educational Software:** Provides content intended for use by students
- **Media Development Software**: Addresses individual needs to generate and print electronic media for others to consume

- **Various Examples Of Application Software Are:**
  - Word processing software
  - Database programs
  - Entertainment software
  - Business software
  - Educational software
  - Computer-aided design(CAD) software
  - Spreadsheet software etc.

- **Stand alone application software**

  - Stand-alone software is an application that does not come bundled with (or require another software package) in order to run.
  - Essentially, it's software that can "stand on its own" without help from the Internet or another computer process.
  - Stand-alone software is installed on your computer, which is very different than online software that runs via your internet browser.
  - Quicken and Microsoft Money is two examples of stand-alone software packages that don't require anything more than the operating system on your computer (whether it's Windows or another operating system).

- o **Different Types of Stand-Alone Software**

  There are several types of stand-alone software. Here are a few examples.

- **Software that runs on its own without an internet connection.**

  An example is an anti-virus software or financial software (like Microsoft money) which can be installed on your computer after inserting an installation disc into your computer or laptop disc drive or portable disc drive.

- **Software that isn't part of a bundle.**

  Many times, this is software that comes with computer hardware or an electronic device. A bundle can also mean several software packages sold together, but most often, you will receive bundled software when you purchase a new computer. A bundle can include antivirus, money management, photo-related and other software.

- **A program that runs separately from all other computer processes.**

  This is a program that doesn't rely on other software in order to function. The most common form of this software is your computer's operating system.

- **A portable application that doesn't need to be installed on your computer.**

  An example is a software program that runs on its own using a disc or flash drive. When not in use, you can easily eject the disc or flash drive. The program, therefore, is self-contained and, conveniently, doesn't take up space on your hard drive.

- **An expansion pack for gaming**.

  If you enjoy playing video games online, you know that gaming software offers expansion packs. In most cases, these packs are "add-ons" to the game. Add-ons might be new weapons or other new items that can be incorporated into an existing game.

- **Multi user application software**
  - o There are two types of users : single user and multi user
  - o **Single-User**

- If you want the software to function as a single-user application, simply use the built-in functionality to create a standard database or Synthesis file and begin working on analyses just as you always have in prior versions.
- You can save the file wherever you wish, transfer it to your laptop; send it by e-mail, etc.


- But now you can:
  - Save your analyses from all Synthesis applications together in the same data file. When you're working on one type of analysis, you won't be overwhelmed by the data stored for other applications... but that information will be available when you need it!
  - Manage analysis projects more effectively. All of the Synthesis applications allow you to save more analysis projects together in the same file and provide built-in tools for managing data.
  - So even if you're still working on your own, it will be easier than ever to find and build upon lessons learned from prior work.

- **Multi-User**
  - Multi-user software is software that allows access by multiple users of a computer.
  - Time-sharing systems are multi-user systems.
  - Most batch processing systems for mainframe computers may also be considered "multi-user", to avoid leaving the CPU idle while it waits for I/O operations to complete.
  - However, the term "**multitasking**" is more common in this context.
  - *[An example is a Unix server where multiple remote users have access (such as via a serial port or Secure Shell) to the Unix shell prompt at the same time. Another example uses multiple X Window sessions spread across multiple*

terminals powered by a single machine - this is an example of the use of thin client. Similar functions were also available under MP/M, Concurrent DOS, Multiuser DOS and FlexOS.]

- Some multi-user operating systems such as Windows versions from the Windows NT family support simultaneous access by multiple users (for example, via Remote Desktop Connection) as well as the ability for a user to disconnect from a local session while leaving processes running (doing work on their behalf) while another user logs into and uses the system. The operating system provides isolation of each user's processes from other users, while enabling them to execute concurrently [dubious – discuss].

- Management systems are implicitly designed to be used by multiple users, typically one system administrator or more and an end-user community.

- [The complementary term, single-user, is most commonly used when talking about an operating system being usable only by one person at a time, or in reference to a single-user software license agreement. Multi-user operating systems such as Unix sometimes have a single user mode or run level available for emergency maintenance]

- If you want the software to function as a multi-user application but you're not ready to establish the IT infrastructure and support required for a more robust database platform, you can place any standard repository file in a network location that's accessible by other users. With this configuration, you can:

- Assign different permissions per user and/or per analysis. For example, a particular user might have read/write access to all projects owned by her department, read-only access to projects owned by other departments, and no access at all to projects designated "confidential."

- Use configurable categories to manage analysis projects. Authorized users can establish categories and sub-categories that are used to organize a large number of analysis projects stored together in the same shared repository.
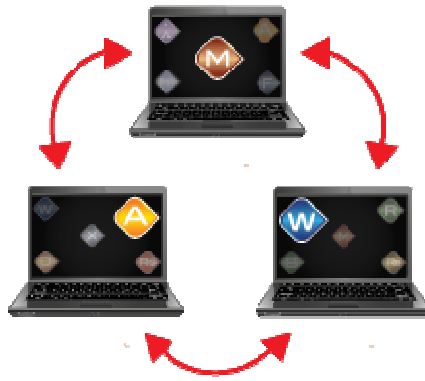
- **Client-server Architecture concept**

  - Client-server architecture (client/server) is (network) architecture in which each computer or process on the network is either a client or a server.
  - **Servers** are powerful computers or processes dedicated to managing disk drives (file servers), printers (print servers), or network traffic (network servers).
  - **Clients** are PCs or workstations on which users run applications. Clients rely on servers for resources, such as files, devices, and even processing power.
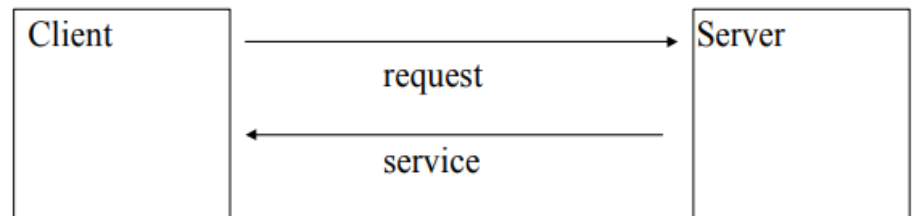
This basic structure is called *2-tier structure*

  - Client/server architecture is a computing model in which the server hosts, delivers and manages most of the resources and services to be consumed by the client.
  - This type of architecture has one or more client computers connected to a central server over a network or Internet connection. This system shares computing resources.
  - Client/server architecture may also be referred to as a networking computing model because all the requests and services are delivered over a network.
  - Client/server architecture is a producer-consumer computing architecture where the <u>server acts as the producer and the client as a consumer.</u>

o The server houses and provides high-end, computing-intensive services to the client on demand. These services can include applications access, storage, file sharing, printer access and/or direct access to the server's raw computing power.

o Client/server architecture works when the client computer sends a resource or process request to the server over the network connection, which is then processed and delivered to the client.

o A server computer can manage several clients simultaneously, whereas one client can be connected to several servers at a time, each providing a different set of services. In its simplest form, the Internet is also based on client/server architecture where the Web server serves many simultaneous users with Web page and or website data.