KASNEB

CICT

PAPER NO: 6

SECTION 2

Computer Support & Maintenance

Contents

CHAPTER 1

Basic Computer Concepts

Defination: A *microcomputer* is a type of computer which is based internally on a *microprocessor*, plus a number of additional components. At its simplest, a microcomputer will consist of a microprocessor, plus random access memory (RAM), read only memory ROM, and an input/output section, connected by the three main communication buses
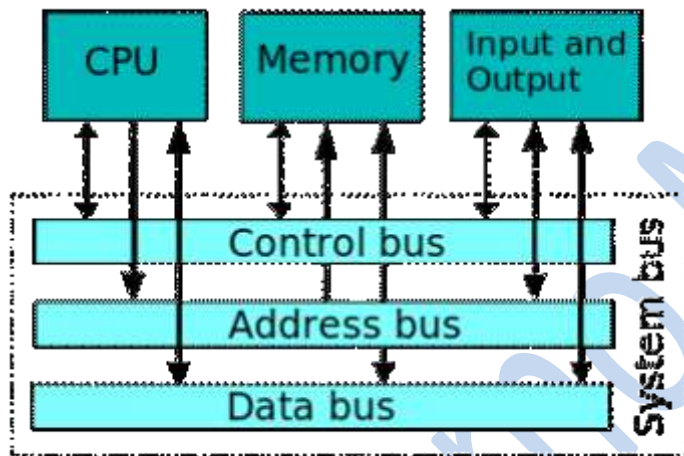
A **microprocessor** is a component that performs the instructions and tasks involved in computer processing. In a computer system, the microprocessor is the central unit that executes and manages the logical instructions passed to it.

Computer Components and Electrical communication

Inside computers, there are many internal components. In order for these components to communicate with each other they make use of wires that are known as a *'bus'* .

A **bus** is a **common pathway** through which information flows from one computer component to another. This pathway is used for communication purpose and it is established between two or more computer components. We are going to check different **computer bus architectures** that are found in computers.

Different Types of Computer Buses
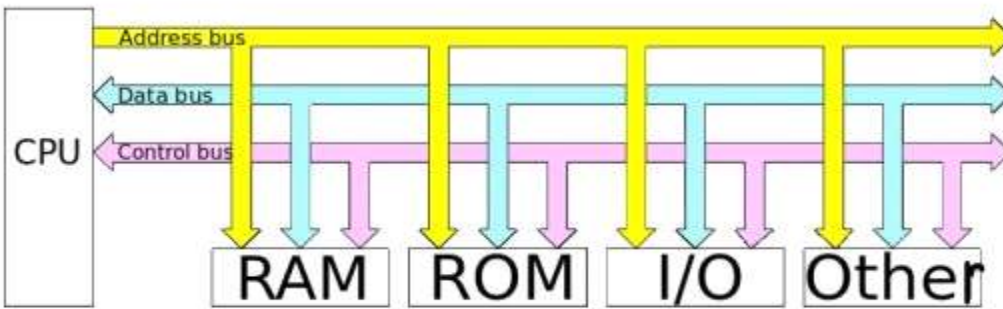
The Computer Buses | Source

Functions of Buses in Computers

Summary of functions of buses in computers

1. **Data sharing** - All types of buses found in a computer transfer data between the computer peripherals connected to it.

The buses transfer or send data in either serial or parallel method of data transfer. This allows for the exchange of 1, 2, 4 or even 8 bytes of data at a time. (A byte is a group of 8 bits). Buses are classified depending on how many bits they can move at the same time, which means that we have 8-bit, 16-bit, 32-bit or even 64-bit buses.

2. Addressing - A bus has address lines, which match those of the processor. This allows data to be sent to or from specific memory locations.

3. Power - A bus supplies power to various peripherals connected to it.

4. Timing - The bus provides a **system clock** signal to synchronize the peripherals attached to it with the rest of the system.

The expansion bus facilitates easy connection of more or additional components and devices on a computer such as a TV card or sound card.

Computers have two major types of buses:
1. System bus:- This is the bus that connects the CPU to main memory on the motherboard. The system bus is also called the front-side bus, memory bus, local bus, or host bus.
2. A number of I/O Buses, (I/O is an acronym for input / output), connecting various peripheral devices to the CPU. These devices connect to the system bus via a 'bridge' implemented in the processors chipset. Other names for the I/O bus include "expansion bus", "external bus" or "host bus".

Basic Computer Components
The basic **components** of a **microcomputer** are: 1) CPU 2) Program memory 3) Data memory 4) Output ports 5) Input ports 6) Clock generator. These **components** are shown in figure below: Central Processing Unit: The CPU consists of ALU (Arithmetic and Logic Unit), Register unit and control unit.

CHAPTER 5

Memory

Memory is the electronic holding place for instructions and data that your computer's microprocessor can reach quickly. When your computer is in normal operation, its memory usually contains the main parts of the operating system and some or all of the application programs and related data that are being used.

Memory is sometimes distinguished from *storage*, or the physical medium that holds the much larger amounts of data that won't fit into RAM and may not be immediately needed there.

Characteristics of Computer Memory
1. Electrical Characteristics - The voltage and current requirements depend on the manufacturing technology of the device. The voltage level is not of major concern because most of the semiconductor memory devices operate at TTL voltage levels.
2. Speed - There is a finite time delay between the application of address and the availability of stable and accurate data on the data lines. This memory delay depends on the manufacturing technology and other factors such as size.
3. Capacity representing the global volume of information (in bits) that the memory can store. Memory is small in size and hence its storage is relatively low

Types of Memories

1. **Random access memory**, generally called **RAM** is the system's main memory, i.e. it is a space that allows you to temporarily store data when a program is running.

   Unlike data storage on an auxiliary memory such as a hard drive, RAM is volatile, meaning that it only stores data as long as it supplied with electricity. Thus, each time the computer is turned off, all the data in the memory are irremediably erased.

2. **Read-only memory**, called **ROM**, is a type of memory that allows you to keep the information contained on it even when the memory is no longer receiving electricity. Basically, this type of memory only has read-only access. However, it is possible to save information in some types of *ROM* memory.

3. **Flash memory** is a compromise between RAM-type memories and ROM memories. Flash memory possesses the non-volatility of ROM memories while providing both read and write access However, the access times of flash memories are longer than the access times of RAM.

TYPES OF MEMORY MODULES PACKAGING
SIMMS
SIMM stands for Single In-Line Memory Module. Like other types of memory modules, a SIMM consist of memory chips soldered onto a modular printed circuit board (PCB), which inserts into a socket on the motherboard. 72 pin SIMMs transfer 32 bits of data at a time, therefore in modern microcomputers with a 64-bit data bus two SIMMs have to be paired up in order to function.

DIMMS
Dual In-line Memory Modules, or DIMMs, closely resemble SIMMs. Like SIMMs, most DIMMs install vertically into expansion sockets. The principal difference between the two is that on a SIMM, pins on opposite sides of the board are "tied together" to form one electrical contact; on a DIMM, opposing pins rem a in electrically isolated to form two separate contacts.

168-pin DIMMs transfer 64 bits of data at a time and are typically used in computer configurations that support a 64-bit or wider memory bus. Some of the physical differences between 168-pin DIMMs and 72-pin SIMMs include: the length of module, the number of notches on the module, and the way the module installs in the socket. Another difference is that many 72-pin SIMMs install at a slight angle, whereas 168-pin DIMMs install straight into the memory socket and remain completely vertical in relation to the system motherboard. The illustration below compares a 168-pin DIMM to a 72-pin SIMM.

4-1/4" 72-Pin SIMM
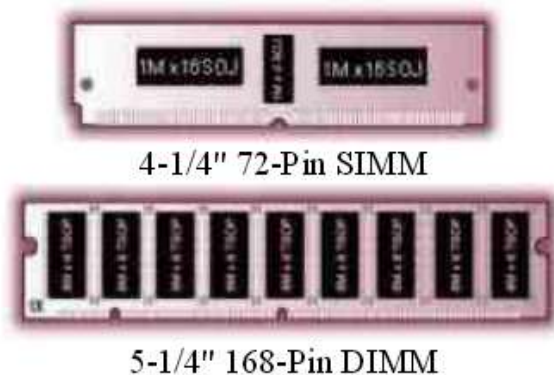
5-1/4" 168-Pin DIMM
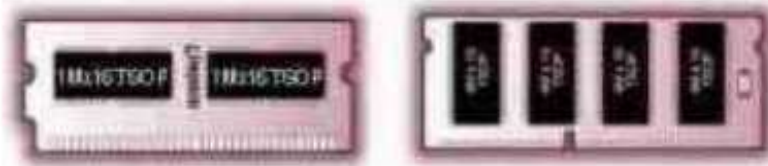
Comparison of a 72-pin SIMM and a 168-pin DIMM.

SO DIMMS
A type of memory commonly used in notebook computers is called SO DIMM or Small Outline DIMM. The principal difference between a SO DIMM and a DIMM is that the SO DIMM, because it is intended for use in notebook computers, is significantly smaller than the standard DIMM. The 72-pin SO DIMM is 32 bits wide and the

144-pin SO DIMM is 64 bits wide.

2.35" 72-pin SO DIMM   **2.66" 144-Pin SO DIMM**

Comparison of a 72-pin SO DIMM and a 144-pin SO DIMM.

RIMMS AND SO-RIMMS

RIMM is the trademarked name for a Direct Rambus memory module. RIMMs look similar to DIMMs, but have a different pin count. RIMMs transfer data in 16-bit chunks. The faster access and transfer speed generates more heat. An aluminums heath, called a heat spreader, covers the module to protect the chips from overheating. A 184-pin Direct Rambus RIMM shown with heat spreaders pulled away.
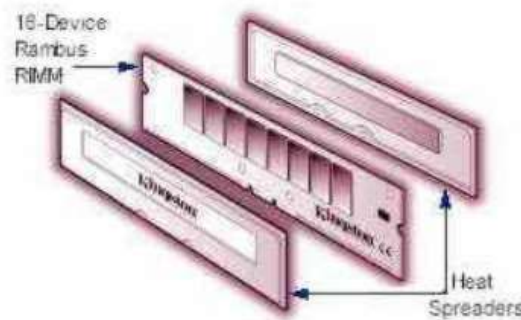
An **SO-RIMM** looks similar to an SO DIMM, but it uses Rambus technology.
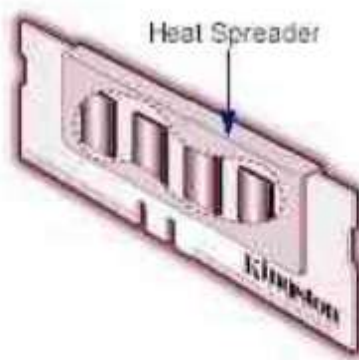
A 160-pin SO-RIMM module.

Memory-Mapping

<u>What Is Memory-Mapping?</u>

Memory-mapping is a mechanism that maps a portion of a file, or an entire file, on disk to a range of addresses within an application's address space. The application can then access files on disk in the same way it accesses dynamic memory. This makes file reads and writes faster in comparison with using functions such as `fread` and `fwrite`.

<u>Benefits of Memory-Mapping</u>

The principal benefits of memory-mapping are efficiency, faster file access, the ability to share memory between applications, and more efficient coding.

<u>Faster File Access</u>

Accessing files via memory map is faster than using I/O functions such as `fread` and `fwrite`. Data are read and written using the virtual memory capabilities that are built in to the operating system rather than having to allocate, copy into, and then deallocate data buffers owned by the process.

<u>Efficiency</u>

Mapping a file into memory allows access to data in the file as if that data had been read into an array in the application's address space. Initially, As a result, memory-mapped files provide a mechanism by which applications can access data segments in an extremely large file without having to read the entire file into memory first.

Memory Mapping types

There are a few different kinds of mappings that can be specified in the map attribute. All use the format described in the previous section.

<u>Device Mapping:</u> The most common kind of mapping. It is used for devices, RAM and ROM objects. The *target* field is not set.
<u>Translator Mapping:</u> Sometimes the address has to be modified between memory-spaces, or the destination memory-space depends on the address or some other aspect of the access such as the initiating processor. In these cases a *translator* can be used. A translator mapping is specified with the translator in the *object* field, and the default target as *target*. The translator has to implement the `TRANSLATE` interface. When an access reaches a translator mapping, the ***translate*** function in the `TRANSLATE` interface is called. The translator can then modify the address if necessary, and specify what destination memory-space to use. If it doesn't specify any new memory-space, the default one from the configuration is used. The following fields can be changed by the translator: `physical_address`, `ignore`, `block_STC`, `inverse_endian` and `user_ptr`.

Translate to RAM/ROM Mapping: Used to map RAM and ROM objects with a translator first. The *object* field is set to the translator, and *target* is set to the RAM/ROM object.

Space-to-space Mapping: Map one memory-space in another. Both *object* and *target* should be set to the destination memory-space object.

Bridge Mapping: A bridge mapping is typically used for mappings that are setup by some kind of bridge device. The purpose of a bridge mapping is to handle accesses where nothing is mapped, in a way that corresponds to the bus architecture. For a bridge mapping, the *object* field is set to the bridge device, implementing the `BRIDGE` interface. The *target* field is set to the destination memory-space.

Selection and upgrading memory

Do you suspect your computer could use more memory? Here's how to tell.

Here are a few simple — but telling — signs that your computer could benefit from a memory upgrade.

You experience poor or sub-par performance in everyday tasks. For instance, a program doesn't respond or seems to take forever to open.

You get system notifications that say "low memory" or "out of memory".

You are having display problems. Like when you pull up a page and it either partially loads or if refuses to load at all. Or you see a blank space where data should be.

In some cases, the PC refuses to operate at all. When you try to open anything, the system will not respond.

If you are experiencing any of these symptoms, a memory upgrade may be in order.

It's easy to tell how much memory is installed on your system and how much is being used.

Hardware Tips: Choose the Right Kind of Memory for Your System

Adding RAM to your PC usually delivers the most bang for your upgrade buck, but only if you buy the right kind of memory module for your PC. There are more types of PC RAM than there are lattes at Starbucks: Do you want SDRAM, PC100, non-parity, or un-buffered DIMM? Why not enjoy a refreshing DDR SDRAM, PC2700, CL2.5, or registered DIMM? Here are the ins and outs of PC memory.

Begin by checking your system's user manual to identify the types of RAM your PC's motherboard supports. If you don't have the manual, visit the manufacturer's Web site and search for downloadable manuals or other tools that might help you find the information you need.

Before you buy, ascertain the following:

Maximum module size**:** Find out the maximum size of memory module that your PC supports. Don't buy a module larger than what your motherboard's memory slots can each accommodate.

<u>RAM and connector types</u>**:** Determine which of the four types of RAM your system uses: DRAM (EDO or FPM), SDRAM, DDR SDRAM, or RDRAM. All four types are mounted on one of three module types: SIMM, DIMM, or RIMM.

Most machines support only one type of RAM and have one type of module or connector, so mixing types isn't an option. The few motherboards that do accept two types of RAM allow only a single type to be used at any one time.

CHAPTER 8

Computer Assembly and Disassembly

When referring to hardware, **disassemble** is the process of breaking down a device into separate parts. A device may be disassembled to help determine a problem, to replace a part, or to take the parts and use them in another device or to sell them individually. For example, if a computer has a bad processor a user may need to disassemble the computer to get to the bad processor and replace it with a good processor.

Assemble is the reversal of disassemble (correct togetherall separate parts to a complete unit)

Computer Selection and compatibility
A family of computer models is said to be **compatible** if certain software that runs on one of the models can also be run on all other models of the family. The computer models may differ in performance, reliability or some other characteristic. These differences may affect the outcome of the running of the software.

Selection of computer upgrade (software and hardware) has to align with compatibility option

Software compatibility

Software compatibility can refer to the compatibility that particular software has running on a particular CPU architecture such as Intel or PowerPC. Software compatibility can also refer to ability for the software to run on a particular operating system. Very rarely is a compiled software compatible with multiple different CPU architectures. Normally, an application is compiled for different CPU architectures and operating systems to allow it to be compatible with the different system. Interpreted software, on the other hand, can normally run on many different CPU architectures and operating systems if the interpreter is available for the architecture or operating system. Software incompatibility occurs many times for new software released for a newer version of an operating system which is incompatible with the older version of the operating system because it may miss some of the features and functionality that the software depends on.

Hardware compatibility
Hardware compatibility can refer to the compatibility of computer hardware components with a particular CPU architecture, bus, motherboard or operating system. Hardware that is compatible may not always run at its highest stated performance, but it can nevertheless work with legacy components. An example is RAM chips, some of which can run at a lower (or sometimes higher) clock rate than rated. Hardware that was designed for one operating system may not work for another, if device or kernel drivers are unavailable. For example, much of the hardware for Mac OS X is proprietary hardware with drivers unavailable for use in operating systems such as Linux.

Steps to a Safe and Successful Disassembly and Assembly of a System Unit
To Disassemble
1. Prepare all your tools.
   a. Long Philip Screw Driver
   b. Rubber Eraser
   c. Soft Wide Bristle Brush
   d. Paper and Pen for documentation

2. Before opening the system case, be sure to turn off the system unit. Turn off and unplug the AVR from the wall socket as well. After that, unplug all the cables connecting to the back of the system unit. After clearing all the connected cables, put the system unit on an empty working table.

3. Touch the unpainted part of your system unit with your bare hands to remove the ESD of your body. This is an important part before opening your system case. You might destroy your RAM, Chipsets and other components of your motherboard.

4. Remove the screws of the side cover opposite to the side where the ports are. By most system cases, if you are facing the back of the system unit the right side cover is to be removed. Return the screws back to the screw holes to avoid losing them.

5. Once the side cover is removed, turn your system side down where the opened side of the

system unit should be facing upward where you can comfortably look down on the inside of your system case.

6. We are now ready to remove the components inside of the computer. The first thing we need to do is remove the power supply. To be able to remove the power supply, remove first the molex connectors (the white plastic connector at the tip of the wires of the power supply) or the motherboard power connector, drive power connectors, the floppy drive power connector, the sata power connectors and the four pin 12-volt motherboard connector. With all power connectosr are removed from the motherboard and drives, the power supply is now ok to be removed as well. Always have the removed components placed in a remote and safe place away from where you are performing computer disassembly.

7. With the power supply removed, the data cable should be removed next. This includes IDE, SATA, and floppy drive cables. Secure the removed data cables.

8. Next to remove are the RAM, Video Card and other card peripheral components. Again have them secured in a safe place and put the screws back. Clean the connector edges of the card peripherals by rubbing the gold colored edge moderately with a rubber eraser then brushing off the shredding. Do not attempt to clean the edge by blowing or brushing it off with your fingers. Our body is acidic and you might only cause the edges to tarnish faster.

9. Remove all drives. This will include your hard drive, cd/dvd drives, and the floppy drive.

10. Since all peripherals where removed, the next thing to do is to remove the front panel connectors. This will include the USB, Front Panel (FP) and Audio header. If you are not sure of which connector is being match to, write down or document the connections and orientation of the connectors before removing them from the headers. Remember that not all motherboards have the same header configuration so be careful and watchful while documenting.

11. After removing the header connectors, we are now ready to remove the motherboard. To remove the motherboard, locate first all the screws and lightly unscrew all screws alternately. With this technique, we are reducing the risk of warping or bending our motherboard. It may not have a large impact on the bending of the motherboard but still it does have even a little. Upon lightly loosening all screws, remove all screws then. Remove the motherboard by carefully and lightly pulling it away from the I/O shield. Why? because we need to free the ports that are fitted from the holes in the I/O shield. After freeing the motherboard ports from the I/O shield holes, lift up the motherboard and put it on the safe place.

12. Clean the system unit chassis with your brush, also clean your motherboard and the rest of the peripherals being removed.

To Assemble
1. Provided that all peripherals are clean and ready. We are now going to assemble your computer. In assembling back your computer, what we have done during disassembling is just doing the reverse order to assemble it. Since the motherboard was last to be removed, it should

then be the first to put back. Remove the retaining screws from the standoff screws of the motherboard and let the motherboard seat on it with the ports facing out towards the I/O shield. Lightly push the motherboard to set its ports to the holes of the I/O shield. Put the retaining screws on the motherboard screw holes but do not tighten it yet. Now be careful in doing this one and if this is your first time doing it, it is best if you lend a hand for assistance. Lightly push the motherboard towards to I/O shield and lightly tighten the motherboard retaining screws alternately until all screws are tight enough but not too tight. This is to ensure that your ports are protruding correctly out of the I/O shield.

2. Once the motherboard is secured, put back the FP, Audio, and USB header connectors as you will be using your documentation for reference.

3. Put back the drives to the correct drive bays.

4. Connect back the RAM, Video Card and other card peripherals to its proper slot inserting it properly and some cards will require screws to be secured.

5. The data cables (IDE, SATA, floppy cable) should be connected to its proper headers and drives. Remember the proper configuration of the placement of the cables specially if you are dealing with the IDE cables.

6. After the data cables are properly connected, put back the power supply and secure it with the screws you removed earlier. After securing the PSU to the chassis, connect the power connectors to the drives and the motherboard.

7. Once all peripherals are connected properly, have a final inspection by visually checking for loose connection or improper connection. Once the system unit connections are thoroughly checked and verified, connect the keyboard; the monitor, and the power connector then power up the computer. This initial powering up of the computer while the side cover is open ensures us that everything is ok before putting back the side cover. In case something goes wrong, we can accessibly correct the problem right away. If everything is fine shutdown the computer, unplugged the AVR and remove the cables connected to the back of your computer. Put the side cover back.

8. Put the assembled computer back to its place and connect the rest of the cables and connectors. Power it up and see if there are unusual effects of your disassembling/assembling procedure done earlier.

Remember SAFETY. Do not neglect it. Neglect can cause catastrophic effects. I will be posting some videos soon if I can buy a video cam early before December. :-) Enjoy **disassembling and assembling your computer safely and successfully**.

What is Computer Hardware?

Hardware, in the computer world, refers to the physical components that make up a computer system.

There are many different kinds of hardware that can be installed inside, and connected to the outside, of a computer.

Below is a list of **external hardware** and **internal hardware** that may be found with a computer.

External hardware examples
- **Projector** - a projector is an output device that can take images generated by a computer and reproduce them on a large, flat (usually lightly colored) surface. For example, **projectors** are used in meetings to help ensure that all participants can view the information being presented.
- **Scanner** - a hardware input device that allows a user to take an image or text and convert it into a digital file, allowing the computer to read or display the scanned object.
- Speakers8
- **USB thumb drive** - a portable drive that is often the size of your thumb that connects to the computer USB port.
- **Flat-panel, Monitor, and LCD** - screen displays
    o **Monitor,** alternatively referred to as a **video display terminal (VDT)** and **video display unit (VDU)**, comprised of a CRT (Cathode Ray Tube) and a fluorescent screen as display system.
    o **Liquid-Crystal Display**, **LCD** is a flat display technology. The LCD is made of two sheets of a flexible polarizing material with a layer of liquid crystal solution between the two and available as an active matrix, dual-scan, or passive-matrix display. i.e. in laptops

THIS IS A SAMPLE

TO GET COMPLETE NOTES, CALL/TEXT/WHATSAPP 0728 776 317 or

EMAIL: info@masomomsingi.co.ke

FB: Masomo Msingi

Twitter: Masomo msingi

Instagram: Masomo Msingi

CHAPTER 12

System selection and acquisition

Procedure for hardware software selection

The systems come with hardware, software and support. Today, selecting a system is a serious and time-consuming   business.
There are several factors to consider prior to system selection :

1. Define the system capabilities that make sense for business. Computers have proven valuable to business in the following areas:

- Cost reduction includes reduction of the inventory, savings on space and improved ability to predict business trends
- Cost avoidance includes early detection of problems and ability to expand operations without adding clerical help.
- Improved service emphasizes quick availability of information to customers, improved accuracy and fast turnaround
- Improved profit reflects the bottom line of the business and its ability to keep receivables within reason.

2. Specify the magnitude of the problem, that is, clarify whether selections consist of a few

Peripherals or major decision concerning the mainframes.

3. Assess the competence of the in-house staff. This involves determining the expertise needed in areas such as telecommunications and data base design. Acquiring a computer often results in securing temporary help for conversion. Planning for this help is extremely important.
4. Consider hardware and software as a package. This approach ensures compatibility. In fact, software should be considered first, because often the user secures the hardware and then wonders what software is available for it.

5. Develop a schedule for the selection process. Maintaining a schedule helps keeps the project under control.

6. Provide user indoctrination. This is crucial, especially for first-time users. Selling the system to the user staff, providing adequate training, and preparing an environment a conductive to implementation are pre- requisites for system acquisition.

Major phases in selection

The selection process should be viewed as a project, and a project team should be organized with management support. In larger projects, the team includes one or more user representatives, an analyst and EDP auditor, and a consultant. Several steps make up the selection process:

1. Requirement Analysis   **2.** System Specification

3. Request for proposals (RFP)   **4.** Evaluation and validation

5. Vendor Selection   **6.** Post Installation Review

1. Requirement Analysis: The first step in selection understands the user's requirements within the framework of the organization's objectives and the environment in which the system is being installed. Consideration is given to the user's resources as well as to finances.

In selecting software, the user must decide whether to develop it in house, hire a software company or contract programmer to create it, or simply acquire it from a software house. The choice is logically made after the user has clearly defined the requirements expected of the software. Therefore, requirements analysis sets the tone for software selection.

2. System Specifications: Failure to specify system requirements before the final selection almost always results in a faulty acquisition. The specifications should delineate the user's requirements and allow room for bids from various vendors. They must reflect the actual applications to be handled by the system and include system objectives, flowcharts, input-output requirements, file structure and cost. The specifications must also describe each aspect of the system clearly, consistently and completely.