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The following items are the recommended component of a PC system that should be on hand before one is built.

1. Case
  2. Mother board
  3. CPU, Cooling fan and Heat transfer paste.
  4. Memory at least 2 sticks ( for redundancy and trouble shooting )
  5. Hard disk drive and IDE cable, one IDE cable will be included in the mother board kit.
  6. CD-ROM and IDE cable, *IDE cable for CD-ROM need be purchased separately.*
  7. Floppy disk drive and cable.
  8. Display adapter card.
  9. Sound card.
  10. Modem card.
  11. Key board.
  12. Mouse.
  13. Monitor.
  14. Softwares
- Mother board driver, ( always come with the

mother board ).

- Software driver for add on cards, Display adapter card, Modem card and Sound card etc. the driver always come with the card on purchased.

- Operating System, ( Windows 98 or XP ) and applications,

Microsoft Office and etc.

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# 1. Case

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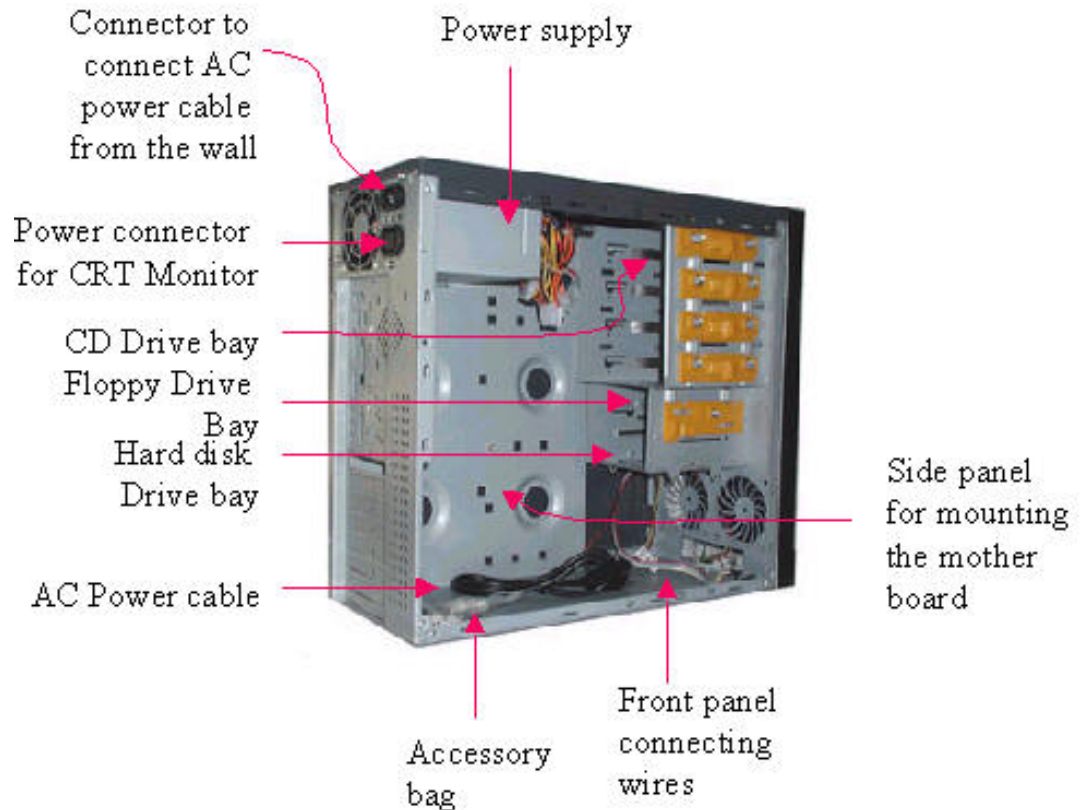
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The standard case should have the following item.

1. Power supply, the case may or may not have it installed, please verify that the case has power supply installed in side, if not, power supply need to be bought separately.
2. AC power cable.
3. The small bag of accessory, in side the bag there should be;
  - standoffs or the spacer, this is used when mount the mother board to the side panel of the case.
  - The screws for mounting the mother board and the drives (Floppy drive, Hard disk drive and CD-ROM drive ).
4. The small speaker.

Inside the case there are drive bays for CD drive, Floppy disk drive and Hard Disk drive.

The medium size case normally will have 4 Bays for drive of CD-Rom size, 2 bay of Floppy drives, one or two Hard Disk drives may be install inside the case.

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Floppy Disk drive

Hard Disk drive



An ordinary case only one or two Hard disk drive may be installed and there is no more slot for more hard Disk drive.

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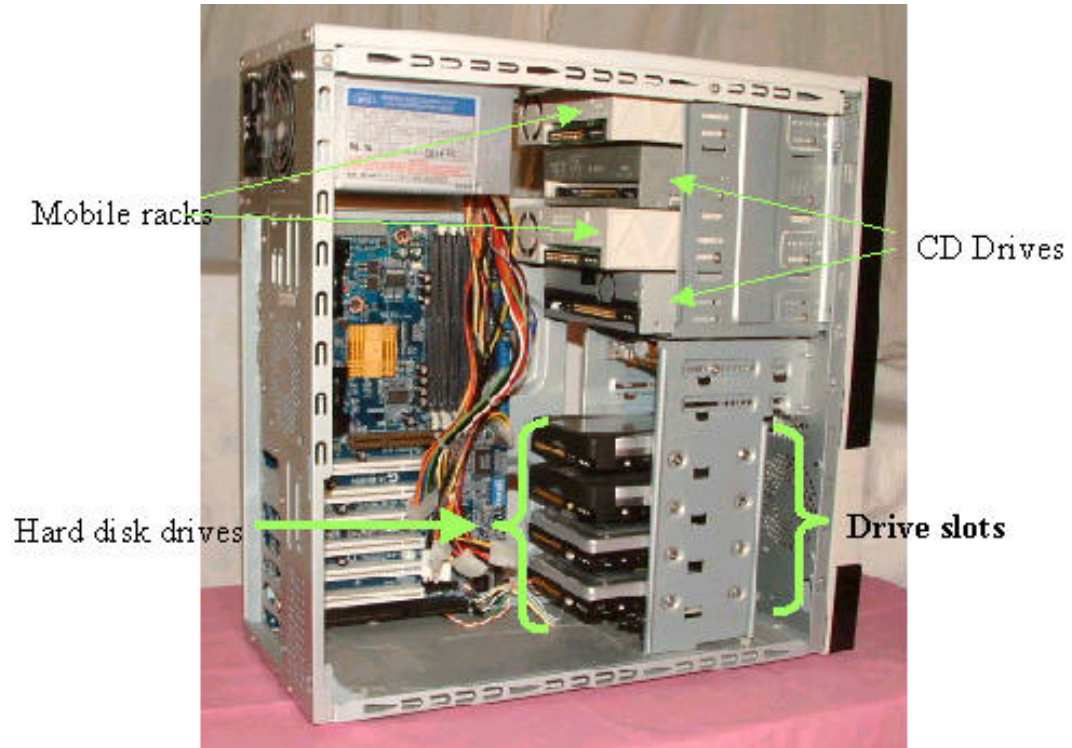
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The case with more drive slots.



If you require to have more than two Hard disk drives to be installed in the case for some special configuration like *Raid* you may want to consider the case like the one above that has many Hard Disk drive slots.

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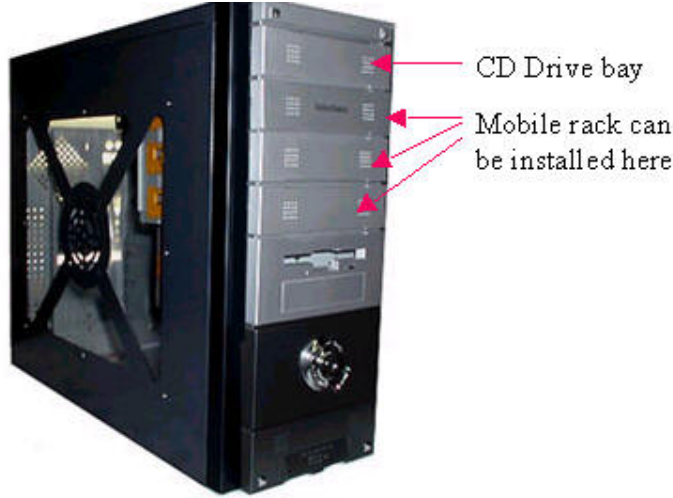
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## Mobile Rack

If you wish to have the Hard disk drive being removable or interchangeable, when you copy hard disk to hard disk or some time you want to boot from different hard disk, you may want to consider to use Mobile rack, the medium size of the case will have 4 drive bays that can be accessed from the front, those bays can be used for CD-drive and for Hard disk mobile rack.



Mobile Rack

Front view

Real view



IDE connector from mobile Rack to the Mother Board

Power connector

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Installing the Hard Disk drive in the drawer.



Connect IDE cable to the mother board

Set jumper on the hard disk for Cable select

Connect power from from power supply

Install the Hard Disk in the drawer of mobile rack, connect IDE and power cable in the drawer to hard disk drive set jumper on the drive at *cabl select*

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## 1.5 Connect the Mobile rack to the Mother board

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Connecting IDE cable from Mobile Rack to the Mother Board

Connect the IDE cable from real of the mobile rack to the mother board same way as connecting Hard Disk dive to the mother board, the drive identification jumper must be set at the drive it self and set at cable select, the mobile rack with drive that connected at the end of IDE cable become Master drive the mobile rack with the drive that connected at the middle of the cable become the Slave drive.

The mobile rack that you want to boot from should be the master and connected at Primary IDE ( primary master ).

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If you are going to have 1 Hard Disk drive and 1 CD-Rom drive installed in case, you will only need 300 watt power supply, but if the system has more than 1 Hard Disk drive installed the power supply should be bigger in capacity like 350 to 400 watt.

When you purchase the case you may want to specify the wattage of the power supply too.

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There are families of the CPU,



1. Socket 478 family of Intel, 2 types are available,

1. Pentium 4 this CPU is ranged 1.4 Ghz. to 3.06 Ghz. this CPU has an internal cache of L1 for 32 KB and L2 for 256 KB or 512 KB.

The highest performance of this CPU at the time this book being wrote is Pentium 4 3.06Ghz it has a special feature called Hyper Thread it look like 2 ( Dual processor ) processor housed in one physical processor.

2. Celeron 478, This CPU is the economical version of Pentium 4, at the time this book is being wrote is ranged 1.7 to 2.2 Ghz and this CPU has an internal cache L2 for 128 KB.

Front side Bus ( System Bus )

These CPU will use the front side Bus 400 or 533 Mhz, the front side bus and the caches size in the CPU may be printed on the CPU it self, *we recommend you to check the front side bus frequency of the CPU you want to buy in the Web site of Intel and take note, when you buy the mother board please make sure that the mother board will supply the front side bus that require by the CPU.*

CPU Internal Cache

The internal cache in the CPU is a temporally storage to store Program and Data that were read from the main memory on the mother board and

make them ready for CPU to execute and process, the speed of the cache is faster than the memory on the mother board this will significantly help to gain the CPU performance, the bigger cache is better, the price is higher too.

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## 2.1 CPU speed, Front side Bus and Cache size

Processor Family	Processor Speed	System Bus Frequency	Cache Size
Intel® Pentium® 4	3.06 GHz	533 MHz	512 KB
	2.8 GHz	533 MHz	512 KB
	2.66 GHz	533 MHz	512 KB
	2.6 GHz	400 MHz	512 KB
	2.53 GHz	533 MHz	512 KB
	2.5 GHz	400 MHz	512 KB
	2.40B GHz	533 MHz	512 KB
	2.4 GHz	400 MHz	512 KB
	2.26 GHz	533 MHz	512 KB
	2.2 GHz	400 MHz	512 KB
	2.0A GHz	400 MHz	512 KB
	2.0 GHz	400 MHz	256 KB
	1.9 GHz	400 MHz	256 KB
	1.8A GHz	400 MHz	512 KB
	1.8 GHz	400 MHz	256 KB
	1.7 GHz	400 MHz	256 KB
	1.6A GHz	400 MHz	512 KB
	1.6 GHz	400 MHz	256 KB
1.5 GHz	400 MHz	256 KB	
1.4 GHz	400 MHz	256 KB	
Intel® Celeron®	2.2 GHz	400 MHz	128 KB
	2.0 GHz	400 MHz	128 KB
	1.8 GHz	400 MHz	128 KB
	1.7 GHz	400 MHz	128 KB

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2. Socket 370 family, there are 3 types of the CPU are available,

1. Intel Pentium III
2. Intel Celeron II

And another manufacturer that manufactures socket 370 CPU is VIA.

3. VIA C3

Intel Pentium III has been built with 2 level of cache integrated in the CPU, Cache Level 1 for 32KB and Cache Level 2 for 256 KB.

Because the speed of the CPU is extremely high they are running at the speed of Giga Hertz ( 1000 Mhz ) while the speed of the memory on the mother board is around 400 Mhz, if the CPU will get the data direct from the memory the CPU will waste so much time waiting.

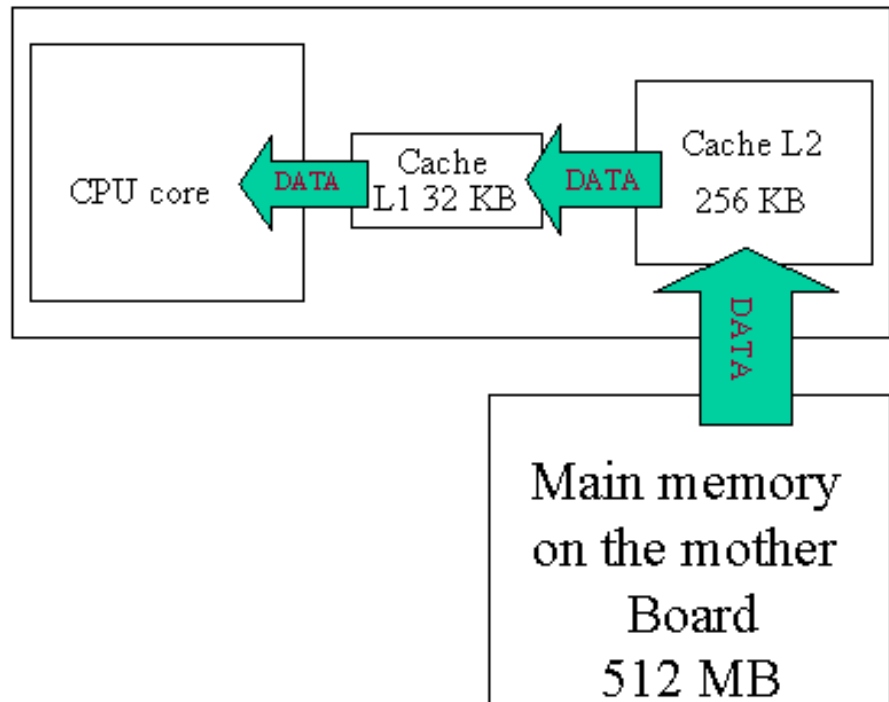
To eliminate the wait time, the CPU manufacturer then use the very high speed memory sit in between the main memory and the CPU, and call them Cache, because the high speed memory is so expensive we can not make it as big as the main memory.

Cache Level 2 is a medium speed memory housed in the CPU, this Cache will accept the data and program from the low speed memory on the mother board.

Cache L1 is a very high speed memory, the speed of L1 is

close to the speed of the CPU and is very expensive in price therefore they don't make it so big in the CPU, this cache will accept the data and program from Cache L2 and deliver to the CPU to enhance the speed of data delivered to the CPU one more step.

## Pentium III



At the time this book is being written the available speed of Pentium III are 1.4 Ghz, 1Ghz, 933 Mhz, 866, Mhz, 850 Mhz, 800 Mhz, 750 Mhz, 733 Mhz, 700 Mhz, 667 Mhz, 650 Mhz. front side bus 100 or 133 Mhz

Pentium III with 512 K L2 is now available at speed 1.13, 1.26 and 1.4 Ghz with front side bus 133.

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### Intel Celeron



- Intel Celeron II, the socket 370 CPU this seems to be an economy version of Pentium III using front side bus 100 or 133 Mhz
- The internal cache of these this CPU is L1 for 32 KB and L2 is 128 KB or 256 KB depends on the speed of the CPU.
- The current available speed is 1.13, 1.26 and 1.40 Mhz. with 256 KB L2 cache front side bus 100 Mhz.

### VIA C3

This CPU is another choice of socket 370 CPU, the lowest price, this CPU has L1 for 128 KB, L2 for 64 KB this CPU is using front side bus 100 or 133 Mhz. the top speed of this CPU is 933 Mhz.

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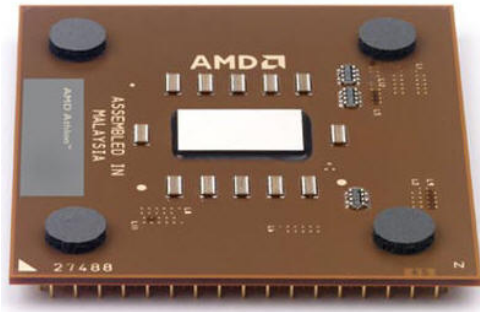
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### 3. AMD family



AMD family has 3 types of these CPU's they are using front side bus 200, 266 or 333 Mhz., the AMD CPU's will fit into socket 462 or called socket A

1. AMD Athlon MP
2. AMD Athlon XP and
3. Duron

1. AMD Athlon MP this CPU is running at front side bus 266 Mhz. with the internal cache L1 for 128 KB, and L2 for 256 KB. currently available at speed 2600+ it has been designed to be able to run in a dual processor configuration.

2. AMD Athlon XP this CPU is running at front side bus 200, 266 or 333 Mhz. this CPU has L1 for 128 KB and L2 256, or 512 KB the newest CPU currently available is Athlon XP 3000+ this CPU is running at core clock 2.167 Ghz. and at front side bus 333 Mhz.

AMD used to be a choice of lower price but with XP 3000+ is not, the performance is extremely high and the current price is higher than P4 3.06 Ghz.

3. AMD Duron is an economy version of CPU socket A this CPU has L1 for 128 KB and L2 for 64 KB currently available at speed 1.3Ghz. at front side bus 200 Mhz.

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In summary,

Intel CPU, the speed is continuity started from Celeron, to Pentium 4

Pentium 4  
Pentium III  
Celeron

The price is roughly define by the CPU speed, from lowest Celeron to highest Pentium 4, the amount of internal cache also effect the price, more cache is higher price.

AMD CPU, the speed started from Duron to Athlon XP, the pricing of AMD is roughly started from lowest Duron to highest Athlon XP

AMD Athlon 3000+  
AMD Athlon XP, Athlon MP  
AMD Duron

The price of Intel compare to AMD may be roughly rankings like this;

Athlon 3000+  
Pentium 4 3.06  
Pentium 4  
Pentium III  
Athlon XP, Athlon MP  
Celeron  
Duron

The performance while between Intel and AMD may be roughly look like this;

Pentium III, Pentium 4                      Athlon XP

Celeron

Duron

The overall performance of the computer system is not only depends on the CPU, the amount of the memory and the speed of the Hard disk drive also play and importance roll.

With the day to day normal application we are not always need a very high power CPU, the high power CPU is good for a very high calculation, sorting, gaming, open or edit a very large document and graphics, with word processing, composing letters, Internet connection most of the time CPU is waiting for in put, high power CPU is higher price, and we may not fully utilize them.

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The memory is a media that store the data and program that read from the hard disk for the CPU to use, there are 3 types of memory available today.

1. SDRAM ( Synchronous Dynamic Ram ) this type of memory is used mainly on the mother board with socket 370 ( Pentium III and Celeron ).



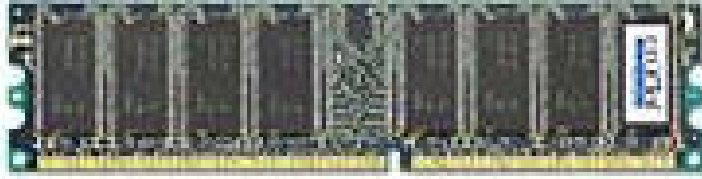
This memory is using front side bus 100 or 133 Mhz. the 133 Mhz memory will work with front side bus 100 Mhz but the 100 Mhz memory may or may not work with front side bus 133, in all case if SDRAM will be used we recommend 133 Mhz. SDRAM.

We recommend you use 2 sticks of SDRAM with your configured amount of memory for example

if you want have 128 MB, instead of using 1 of 128 MB SDRAM it is better to use 2 of 64 MB SDRAM,

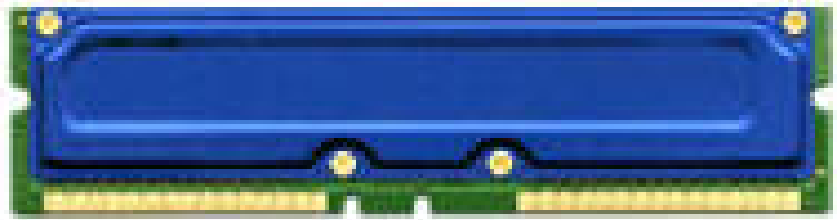
or if you want to have 256 MB in the System it is better to use 2 of 128 MB, this is for redundancy purpose if one memory stick fail we can remove the bad one and the computer system still continue to work.

2. DDR ram ( Double Data Rate SDRAM ) this is the most popular and *most recommended memory* for today, the speed of this type of memory is higher than SDRAM, this type of memory is used mainly on the mother board with socket 478 and with AMD CPU's.



This type of memory is using front side bus 200, 266, 333 or 400 Mhz., we also recommend that you use 2 stick of memory for the mount of memory you want to have in your System.

3. RDRAM this is a very high speed memory, this type of memory is running at frequency 600, 711, or 800 Mhz. it is mainly used together with Pentium 4 CPU on the mother board with front side bus 400 Mhz.



This type of memory must be used in pair it will not work with single memory stick installed on the mother board, the empty memory socket on the mother board must have CRIMM installed, CRIMM is a dummy memory stick that does not have memory chip on it, the CRIMM will come with the mother board and not available for purchasing separately.



C-RIMM

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The guide line in choosing the hard disk drive.



- **Capacity**  
The available capacity can be found are 10, 20, 30, 40, 80, 120 and 200 Gigabyte.
- **Data transfer rate**  
The data transfer rate available are 33, 66, 100 or 133 Megabyte/sec, today's data transfer rate that easy to find is 100 or 133 ( ATA 100, ATA 133 ).
- **Spinning speed of the hard disk.**  
4200, 5400, 7200, 1000 R.P.M. ( Revolution Per Minute )
- **Serial ATA**  
The Disk drive with new designed interface that can transfer Data at 150 Megabyte/sec and will be 300 and 600 MB in the future.

### Capacity

To choose the capacity of the hard disk will depends on how the computer is used.

1. If the Computer is using by a single user and the application is not going to build a very large file then the capacity of 20 to 30 GB should be sufficient.

2. One physical hard disk drive can be set up to have more than one partition ( logical drive ) and each logical drive will have it's own drive letter assigned to them ( drive C:, D:, or E: until Z: )

If there are more than one user using the computer and each user want to have their own disk space to store their own files, then one physical drive will have to have more than one partition ( logical drive ), for example there are 3 user each user need 10 GB, then we want to make 4 logical drive with in one physical disk, the 1st logical drive is drive C: may be define for 10 GB will be used for storing the operating system and program, the other 3 logical drive D:, E: and F: for 10 GB. each for each user to store their file, in total we will have 4 logical drive of 10 GB then we need 40 GB hard disk drive.

3. The other advantage of having more than one logical drive is for simplify in managing the data, the first logical drive ( drive C: ) may be used to store the operating system and program the other logical drive may be used to store the data of different type of application, this way of setup will need a big hard disk.

### The data transfer rate

The higher is better, currently available in the market is 100 ( ATA 100 ) and 133 ( ATA 133 ) Megabyte/sec.

### Spinning speed of the hard disk

The higher is better, the spot where the data to be read or wrote on the disk surface that is far away from the Read Write head will come to Read/Write head quicker and will make computer boot faster and make disk copy faster too,

but the price is also higher.

### Serial ATA

The maximum data transfer rate of the IDE hard disk is 133 MB/sec, If you need higher data transfer rate, Serial ATA is the choice, current data transfer rate available for Serial ATA is 150 MB/sec.

### Summary

High speed hard disk is suitable for the extremely high hard disk activity application, constantly read, write and seek.

With ordinarily PC application the high speed hard disk will not make so much difference but the price is much higher.

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## 5. Choosing the Mother Board

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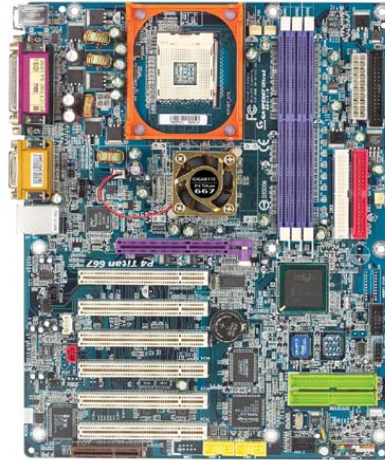
#### [5. Mother Board](#)

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The guide line in choosing the Mother board.



Before you purchase the mother board we recommend that you read through the mother board user manual and point out the following points.

1. The mother board must support the CPU you want to use, and maximum CPU speed that the mother board will support, this is for the future up grade,
2. The type of memory the mother board will support, the mother board must support the CPU and memory you want to use.
3. The front side bus frequency, the mother board must supply the front side bus that required by the CPU and Memory that you want to use.

The socket 370 mother board will supply the same front side bus to CPU and Memory, this mean that the CPU and the Memory must use the same front side bus.

4. If you want to use Pentium 4 3.06 with Hyper Thread feature the BIOS in the mother board must have ability

to support the Hyper Thread feature in the CPU, to make the Hyper Thread works.

5. Hard disk with RAID configuration, the standard mother board will have 2 IDE ports and will not have ability to be configured as RAID, if the RAID configuration is required the mother must have the extra IDE port that support RAID configuration.
  
6. Serial ATA, if serial ATA is required then the mother board must specifically be choose and has serial ATA ports on the mother board.

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## 5.1 Mother Board Package

### PC components

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#### 3. Memory

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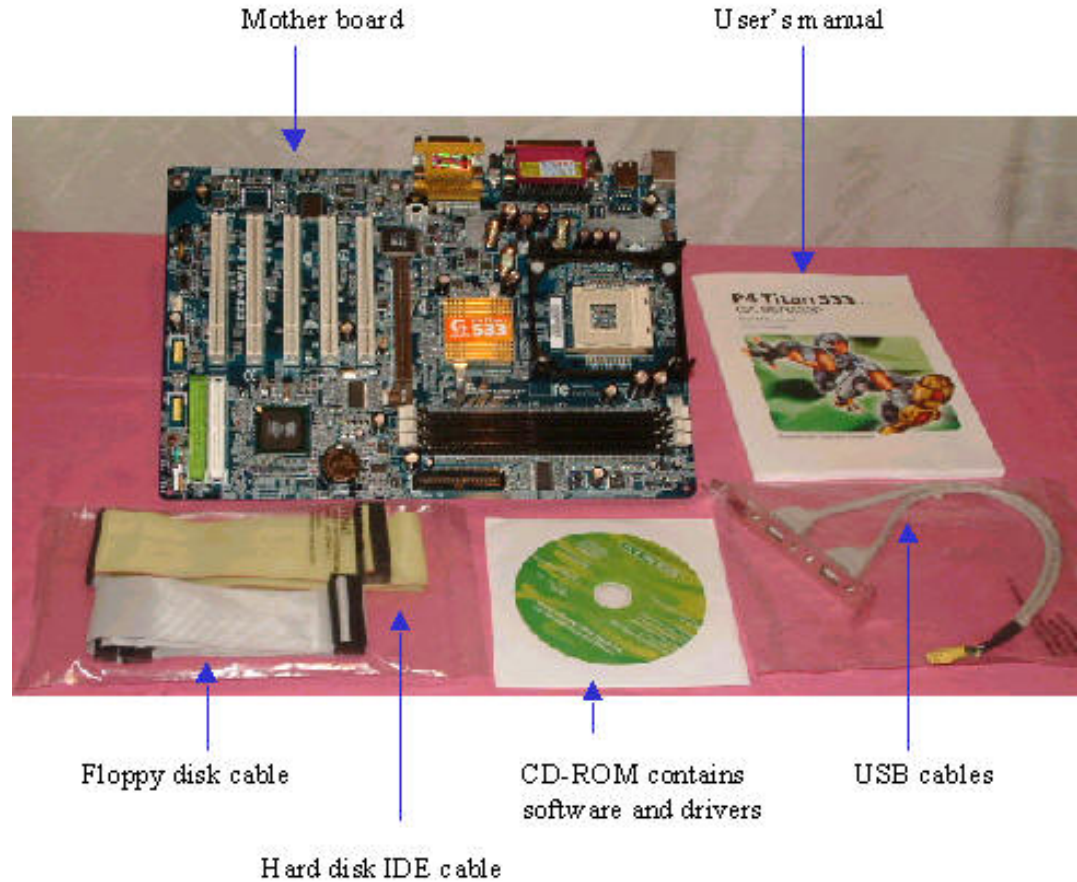
#### 5. Mother Board

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What are included in the mother package, following are approximate items that should be included in the package when we purchased the mother board.



1. Mother board in the electrostatic protective plastic bag.
2. Mother board user Manual.
3. One IDE hard disk drive cable, *IDE cable for CD-Rom drive need be purchased separately.*
4. One floppy disk drive cable.
5. CD-Rom that contains the software and driver for mother board and on board IO's, Sound system, Network adapter or Display adapter.

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## 6. *Choosing the Display adapter card*

### PC components

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##### 2.2 CPU continue

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#### 3. Memory

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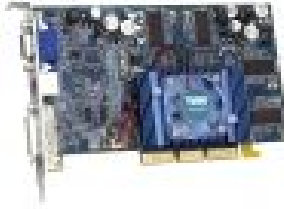
#### 5. Mother Board

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#### 6. Display Adapter Card

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Choosing the display adapter card.



Each of the display adapter cards available in the market today has been designed to suite the need of each type of applications, there are cards that was designed for Games and Graphics that has more Video memory on the card, very high speed and high price.

The major concern is the AGP port on the mother board.

The 1/2 x AGP card will not work with the 4/8 x AGP port and 4/8 x AGP card will not work with 1/2 x AGP port, unless the mother board has the switch or jumper to select either type of AGP card.

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## *7. Hardware Compatibility List*

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To make sure that the adapter cards you intend to buy like Modem card or Network card will work with Windows operating system and easy to install, you can check with Microsoft website below.

<http://www.microsoft.com/hwdq/hcl/search.asp>

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