Grid Computing

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- What is grid Computing
- Benefits of grid computing
- Grid terms and concepts
- Grid user roles

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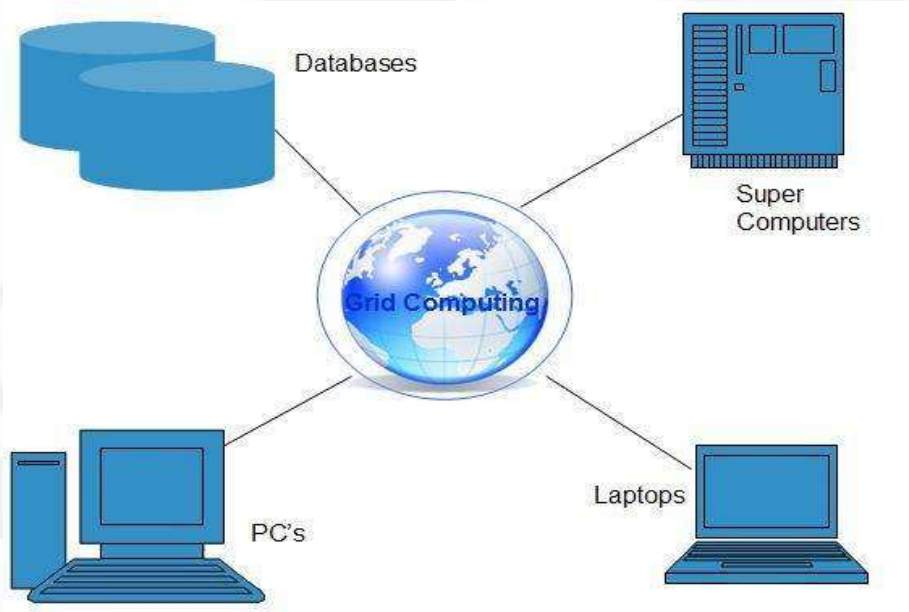
What is grid Computing:

- **Grid Computing** refers to distributed computing, in which a group of computers from multiple locations are connected with each other to achieve a common objective. These computer resources are heterogeneous and geographically dispersed.

- Grid Computing breaks complex task into smaller pieces, which are distributed to CPUs that reside within the grid.



What is grid Computing:

Grid computing can mean different things to different individuals. The grand vision is often presented as an analogy to power grids where users (or electricalappliances) get access to electricity through wall sockets with no care orconsideration for where or how the electricity is actually generated.

In this view of grid computing, computing becomes pervasive and individual users (or client applications) gain access to computing resources (processors, storage, data, applications, and so on) as needed with little or no knowledge of where those resources are located or what the underlying technologies, hardware, operating system, and so on are.

Benefits of grid computing:

- **Exploiting under utilized resources**
- **Parallel CPU capacity**
- **Virtual resources and virtual organizations for**
- **Collaboration**
- **Access to additional resources**
- **Resource balancing**
- **Reliability**
- **Management**

Grid terms and concepts

Computation

The most common resource is computing cycles provided by the processors of the machines on the grid. The processors can vary in speed, architecture, software platform, and other associated factors, such as memory, storage, and connectivity. There are three primary ways to exploit the computation resources of a grid.

Storage

The second most common resource used in a grid is data storage. A grid providing an integrated view of data storage is sometimes called a data grid. Each machine on the grid usually provides some quantity of storage for grid use, even if temporary. Storage can be memory attached to the processor or it can be secondary storage, using hard disk drives or other permanent storage media. Memory attached to a processor usually has very fast access but is volatile. It would best be used to cache data or to serve as temporary storage for running applications.

Grid terms and concepts

Communications

The rapid growth in communication capacity among machines today makes grid computing practical, compared to the limited bandwidth available when distributed computing was first emerging. Therefore, it should not be a surprise that another important resource of a grid is data communication capacity. This includes communications within the grid and external to the grid.

Communications within the grid are important for sending jobs and their required data to points within the grid. Some jobs require a large amount of data to be processed, and it may not always reside on the machine running the job. The bandwidth available for such communications can often be a critical resource that can limit utilization of the grid.

Grid terms and concepts

Software and licenses

The grid may have software installed that may be too expensive to install on every grid machine. Using a grid, the jobs requiring this software are sent to the particular machines on which this software happens to be installed. When the licensing fees are significant, this approach can save significant expenses for an organization.

Some software licensing arrangements permit the software to be installed on all of the machines of a grid but may limit the number of installations that can be simultaneously used at any given instant. License management software keeps track of how many concurrent copies of the software are being used and prevents more than that number from executing at any given time. The grid job schedulers can be configured to take software licenses into account, optionally balancing them against other priorities or policies.

Grid user roles:

Enrolling and installing grid software

A user may first have to enroll in the grid and install the provided grid software on his own machine. He may optionally enroll his machine as a donor on the grid. Enrolling in the grid may require authentication for security purposes. The user positively establishes his identity with a Certificate Authority. This should not be done solely via the Internet. The Certificate Authority must take steps to assure that the user is in fact who he claims to be. The Certificate Authority makes a special certificate available to software needing to check the true identity of a grid user and his grid requests. Similar steps may be required to identify the donating

Logging onto the grid

Most grid systems require the user to log on to a system using an ID that is enrolled in the grid. Other grid systems may have their own grid login ID separate from the one on the operating system. A grid login is usually more convenient for grid users. It eliminates the ID matching problems among different machines. To the user, it makes the grid look more like one large virtual computer rather than a collection of individual machines. Some grid environments may use a proxy login model that keeps the user logged in for a specified amount of time, even if he logs off and back on the operating system and