Chapter 1

What is pervasive computing?

→ Pervasive computing, which is also known as ubiquitous computing, is defined as the use of computerized technology through various devices in various settings around the clock. Pervasive computing, also called ubiquitous computing, is the growing trend of embedding computational capability (generally in the form of microprocessors) into everyday objects to make them effectively communicate and perform useful tasks in a way that minimizes the end user's need to interact with computers as computers. Pervasive computing devices are network-connected and constantly available. Unlike desktop computing, pervasive computing can occur with any device, at any time, in any place and in any data format across any network and can hand tasks from one computer to another as, for example, a user moves from his car to his office. Pervasive computing devices have evolved to include:

- laptops;
- notebooks;
- smartphones;
- tablets;
- wearable devices; and sensors (for example, on fleet management and pipeline components, lighting systems, appliances).

What does ubiquitous computer mean?

→ An environment in which devices, present everywhere or existing everywhere, are capable of some form of computing can be considered a ubiquitous computing environment. An example is when a registered user for Audible, Amazon's audio book server, starts his or her book using the Audible app on a smartphone on the train and continues listening to the book through Amazon Echo at home.

What are the principles of pervasive computing?

→ The main goal of pervasive computing is to embed computation into an environment that allows users to enjoy every day objects' benefits through information processing. There are four key principles of pervasive computing:

- Decentralization: This principle indicates that all computing should be done by nodes or individual computing devices on a distributed network. A central location or hub is unnecessary for users to communicate in an open community that changes dynamically.
- Diversification: Pervasive computing should occur even on the smallest of devices to supply a few or at least one type of data point. A laptop or mobile phone should, thus, process information.

- Connectivity: Pervasive computing-enabled devices should be able to act in a synchronized manner when linked to infrastructures like the Internet or even a home or office network.
- Simplicity: Perhaps the most crucial feature of pervasive computing is that devices should work even without acknowledging their existence. Users should not have to alter or manually enter data to facilitate connections; otherwise, the pervasive computing environment ceases to be "pervasive." It must be open and nonrestrictive.

Benefits of pervasive computing

→ 7 Benefits of pervasive computing given below:

1. Invisible: "Smart" environments will be embedded with computing technologies that will be mostly out-of-sight. Architecture will gain many more capabilities – with less visual clutter.
2. Socialization: Interactions with architecture will be more social in nature. "Smart" devices will elicit a more social response from occupants as computers user interfaces embed themselves within architecture.
3. Decision Making: "Smart" environments will help occupants to make better choices as they go about their everyday lives. At key moments within architectural experiences, a good architectural design will make "smart" environments helpful. Such architecture will be more proactive than passive.
4. Emergent Behavior: Devices are now becoming more and more kinetic in form and function. Their movements and constructed designs come together dynamically to yield behaviors that make them more adaptive. Devices will learn how to learn – in order to run efficiently and aesthetically.
5. Information Processing: Since architecture will be gaining a type of "nervous system", information processing will be gaining a whole new meaning. Architecture will go from crunching data to making sense of data; therefore, eliminating our need to constantly input adjustments.
6. Enhance Experience: As computers ubiquitously embed themselves in our environments, sensors and actuators will create "smart" environments where architectural space will be goal-oriented. Therefore, more occupant needs will be better met.
7. Convergence: Much of our environment will be supplemented with interconnected digital technologies. Such interconnectivity will allow for a new type of "sharing" that will serve to eliminate many boring tasks. Also, fewer errors will occur as systems pull data from shared digital locations.

Pervasive Information Technology

Pervasive information technology shows a three tier vertical structure:

- **Device:** The front-end of information technology is the wide range of pervasive devices, designed for creating and accessing information on the fly. These devices are the most visible interfaces to the user and penetrate our business and all day life.
- **Workstation:** Workstations form an optional middle tier. The traditional Personal Computer offers capabilities for working with complex information and managing local personal devices. Often, this layer is even omitted, since most pervasive appliances are able to access their provider's networks directly. Devices like set-topboxes can replace or complement the personal workstation as a gateway between personal devices and public networks.
- **Server:** Web servers, enterprise servers and mainframes mainly focus on storing and processing large amounts of information using their strong computing power.