

Chapter 1

Introduction to Processor Arrays

1.1 Objective:

- At the end of this lecture, the learner would be able to:
 - Define a Vector Computer
 - Understand the methods for implementing a vector computer
 - Determine the performance of a Processor Array.

1.2 Processor Arrays

First we will start our discussion with processor arrays. One of the important processor array is a vector computer. Now let us see the definition of a vector computer.

Vector Computer:

A computer that is capable of carrying out operations on vectors and scalars.

Two Important ways of implementing a vector computer:

1. **Pipelined Vector Processor:** A processor that manipulates vectors using pipelined units is called a vector processor. Example: CRAY-1, Cyber-205
2. **Processor Array:** It is a vector computer where a set of identical synchronized processing elements concurrently do the same operation on different data.

A diagrammatic representation of a processor array is given below.

1.2.1 Types of Processor Arrays

Processor arrays can be organized as follows:

1. hypercubes
2. shuffle exchange network
3. cube connected cycles and
4. 2D mesh.

Figure 1.1: A representation of Processor Array

1.2.2 Performance of a Processor Array

Now we will identify a method to determine the performance of a processor array.

- It is measured as the number of operations per second.
- It is based on the processor utilization.
- The size of the data structure that is currently manipulated is directly proportional to the performance.

