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Cluster Computing Characteristics and Design Principles

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Abstract: Cluster computing is the growing field to connect a set of loosely coupled computers to find a common answer to several complex problems. This process helps in reducing cost and improving network technology in all possible situations. Cluster computers enable scalable parallel and distributed computing in scientific and commercial applications. This chapter introduces the key concepts needed to understand cluster computing, components of cluster, cluster architecture, cluster characteristic, design principles of clusters and applications of cluster.

Keywords: Scalability, High-Availability (HA), Flexibility, High Processing Speed, Single-System Images (SSI), Node Failure Resistant, RMS

1. Introduction

Cluster is defined as a group of homogeneous or heterogeneous computers which are connected together to complete common task with their parallel processing ability. A cluster can be well-managed by a decentralized or centralized pattern/ fashion. A homogeneous cluster has the ability to use nodes of the same platform while a heterogeneous cluster has the ability to use nodes of different platforms. Further this cluster technique is so popular because of additional backup server availability in case of failure, scalability, cost efficient and more important, processing powder to complete the task with minimum time. Cluster computers are taking the lead roles in high performance computing (Sharma et.al. 2009). These computers connected through dedicated LAN connection and trust each other to share resources, perceived as parallel/distributed processing system. Further, each participated entity is having its own Operation System (OS), memory, single/multiprocessor unit. Deployment of computer clusters support from small range applications to fastest supercomputers