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Data center network architecture in cloud computing: review, taxonomy, and open research issues

JZUS C (Comput & Electron)

Key words: Data center network, Cloud computing, Architecture, Network topology

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Motivation

- The data center network (DCN) is an important component of data centers to support wide use of cloud-based services.
- The traditional DCN architecture lacks aggregate bandwidth, scalability, and cost effectiveness with increasing scale of DCN, and a novel DCN architecture is required.
- Giving a review of current various DCN architectures is necessary and important in the era of cloud computing.

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We have:

- reviewed the recent research findings and technologies of DCN architectures to identify the issues of DCN in cloud computing,
- developed a taxonomy and qualitatively analyzed the traditional and contemporary DCN architectures, and
- compared the current architectures on the basis of bandwidth, fault tolerance, scalability, overhead, and deployment cost.

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We've also pointed out:

- advantages and disadvantages of the current DCN architectures according to the proposed taxonomy and classifications (Clos/tree-based, valiant load balancing, hierarchical recursive, optical wireless, and randomly connected),
- key challenges, including congestion control and load balancing/flow scheduling, and
- open research issues, including energy efficiency, network optimizing, novel network architectures, compatibility, research and improvement of the DCN protocol, automatic IP address assignment, and future applications of optical switching and wireless transmission.

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