Study of Chord Protocol in Peer-to-Peer Networks

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***Abstract*—This thesis explores the Peer-to-Peer (P2P) network architecture and the Chord protocol, focusing on the Chord protocol's operation and its simulation using OverSim. The study covers the history, applications, and search mechanisms of P2P networks, as well as the Distributed Hash Table (DHT) used in the third generation of P2P networks. The research involved a theoretical study of P2P networks and the Chord protocol, followed by the simulation of the Chord protocol using OverSim software. The thesis documented the operation of the Chord protocol, including routing, node joining and leaving, and network stability. The simulation results were visualized using P2PSim and OverSim. The findings highlighted the importance of Chord in P2P networks, particularly in routing and data management. The limitations of the study, such as time constraints, were acknowledged.**

***Index Terms*—Peer-to-Peer, Chord Protocol, Distributed Hash Table, Routing**

I. Introduction

The thesis provides an overview of P2P networks, including their history, classification, and applications. It delves into the Chord protocol, detailing its operation and simulation, aiming to understand its algorithm and functionality. The study covers the history of P2P networks, starting from their early development and evolution. It also discusses the classification of P2P networks based on their architecture, such as pure P2P and hybrid P2P networks. The thesis explores the search mechanisms in P2P networks, including centralized indexing, flooding, and routing models. It further examines the applications of P2P networks, such as communication, file sharing, bandwidth, storage, and processor cycles. The limitations of the current research, such as time constraints, are acknowledged [1]. Published books on the methods and subject of this project provide context for this English summary [4]. Published articles on the methods and subject of this project provide context for this English summary [5], [6], [7], [8], [9], [10], [11].

II. Methods

The research involved a theoretical study of P2P networks and the Chord protocol, followed by the simulation of the Chord protocol using OverSim software. The study began with an in-depth theoretical analysis of P2P networks, their history, and the Chord protocol. The Chord protocol was then simulated using OverSim, a software tool designed for simulating P2P networks. The simulation involved setting up a network environment, configuring nodes, and running the Chord protocol to observe its behavior. The results were visualized using P2PSim and OverSim, providing a clear understanding of the protocol's operation and stability [1].

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III. Results

The thesis documented the operation of the Chord protocol, including routing, node joining and leaving, and network stability. The simulation results were visualized using P2PSim and OverSim. The Chord protocol was found to be effective in routing and data management, with nodes efficiently joining and leaving the network. The network stability was maintained even under varying conditions, demonstrating the robustness of the Chord protocol. However, the study did not include a direct comparison with other P2P protocols, and the simulation results were based on a limited number of nodes and scenarios [1].

IV. Discussion

The findings highlighted the importance of Chord in P2P networks, particularly in routing and data management. The Chord protocol's ability to handle node joining and leaving was noted, as well as its stability under varying network conditions. The limitations of the study, such as time constraints, were acknowledged. The research did not include a comprehensive evaluation of the Chord protocol's performance compared to other P2P protocols. Future work could involve more extensive simulations and comparisons with other P2P protocols to provide a more comprehensive understanding of the Chord protocol's strengths and weaknesses [1].

V. Conclusion

The study successfully explored the Chord protocol and its simulation, contributing to the understanding of P2P networks. The research involved a theoretical study of P2P networks and the Chord protocol, followed by the simulation of the Chord protocol using OverSim software. The findings highlighted the importance of Chord in P2P networks, particularly in routing and data management. The limitations of the study, such as time constraints, were acknowledged. Future work could involve more extensive simulations and comparisons with other P2P protocols to provide a more comprehensive understanding of the Chord protocol's strengths and weaknesses [1].

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