Chapter 3
Centralized to Decentralized Social Networks: Factors that Matter

ABSTRACT
This work covers the research work on decentralization of Online Social Networks (OSNs), issues with centralized design are studied with possible decentralized solutions. Centralized architecture is prone to privacy breach, p2p architecture for data and thus authority decentralization with encryption seems a possible solution. OSNs’ users grow exponentially causing scalability issue, a natural solution is decentralization where users bring resources with them via personal machines or paid services. Also centralized services are not available unremittingly, to this end decentralization proposes replication. Decentralized solutions are also proposed for reliability issues arising in centralized systems and the potential threat of a central authority. Yet key to all problems isn’t found, metadata may be enough for inferences about data and network traffic flow can lead to information on users’ relationships. First issue can be mitigated by data padding or splitting in uniform blocks. Caching, dummy traffic or routing through a mix of nodes can be some possible solutions to the second.

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OSN INTRODUCTION AND MOTIVATION TOWARDS DOSN

Online social networks (OSNs) result from online interactions between people and communities (groups), for example Facebook, Twitter etc. In the current centralized paradigm, most of the OSN providers grant free services to its users and in exchange reserve the rights to use the data shared/published by users in any possible way. This raises serious privacy and content ownership concerns and requires a strong trust in the OSN providers. Also OSNs need to be highly scalable to incorporate exponentially growing number of users which is difficult for a centralized architecture. Availability of data might also become an issue in terms of servers’ downtime and service shut down. Moreover there is a severe lack of interoperability between different OSN sites, so users wanting to share same data on different OSNs need to upload it separately and developers are compelled to develop same social applications using different APIs to deploy on different OSNs.

These issues being faced by centralized OSNs motivated the research for decentralizing the OSNs, the work in this field addresses privacy and access control, availability of data, scalability, usage of data under different administrative domains by social applications etc.

Section II introduces Decentralized OSN (DOSN) and defines an abstract architecture model. Section III talks about the issues of centralized OSNs as motivational factors for seeking peer-to-peer (p2p) solutions. In section III we elaborate the work with respect to specific factors. Section IV concludes the paper.

DOSN ARCHITECTURE

In simple words DOSN can be defined as an online social service with an underlying distributed network layout which lets users communicate and share. A general architecture layout for DOSN inspired by the work of Paul et al. (2014) is shown in figure 1. It comprises of a lowest Network layer, a middle layer consisting of DOSN’s core functionality and an upper layer subdivide in two layers with upper most being a user interface and the lower one hidden from users providing services to upper layer.

Figure 1. DOSN Architecture