Guest Editors’ Introduction

T he rapid proliferation of rich social media, online communities, and collectively produced knowledge resources has accelerated the convergence of technological and social networks, resulting in a dynamic ecosystem of online social networking services, environments, and applications. Online social networks (OSNs) represent one of the most popular application categories on the Web, attracting a massive user base that claims more than two thirds of the world’s Internet population. OSNs such as Facebook, LinkedIn, Google+, and Twitter provide computer-mediated support for those wanting to establish social relations over the Internet, and promote a vision of a more personalized Web in which our network of friends, colleagues, peers, and family becomes our primary source of information, just as it is offline.

The OSN Explosion

Major OSNs have opened their APIs to developers, leading to applications that leverage the underlying social graph to support new ways of social interaction and are taken up by millions of users through viral distribution. According to recent reports, online social networking accounts for almost 10 percent of all time spent on the Internet; together with blogs, OSN usage has overtaken email to become the fourth most popular online sector (http://blog.nielsen.com/nielsenwire/wp-content/uploads/2009/03/nielsen_globalfaces_mar09.pdf). Researchers believe that the impressive growth in the sheer volume of users, the diversity of applications run using OSNs as distribution platforms, and the wide range of new technologies underpinning OSN growth, offer strong evidence that OSNs’ wide adoption will endure in the future.

OSNs’ proliferation has also had a profound impact on the Internet, reshaping its structure, design, and utility. In fact, the online social networking industry aspires to become a second Internet, one that includes users’ most personal data and resides entirely on social networking servers. So, OSNs are expected to become the largest source of personal data online,
Infrastructures for Online Social Networking Services

the predominant driver of Web traffic, and a dominant power in Web advertising. Industry experts believe that online social networking services potentially transform consumer behavior and will have far-reaching effects on traditional industries such as content, media, and communications, opening new pathways in social networking monetization.

However, despite the impressive success of OSNs, the research community must address significant challenges to enable further development of these services. Such challenges include the development, deployment, management, and operation of scalable, secure, and interoperable OSN infrastructures that can sustain continuous innovative application development, improved user experience, high-quality service provision, privacy protection, and a healthy market expansion.

In This Issue

Given the continued, intense activity in and the dynamic evolution of online social networking services, we invited researchers and practitioners to submit articles to this special issue that describe recent efforts and results in systems, software, and services that provide novel, ubiquitous, scalable, secure, and trustworthy OSN infrastructures. The three articles we selected expose only the proverbial tip of the iceberg.

In “The Social Hourglass: An Infrastructure for Socially Aware Applications and Services,” Adriana Iamnitchi, Jeremy Blackburn, and Nicolas Kourtellis envision an infrastructure that cumulates social signals from various services and sources for analysis and interpretation that can in turn enable value-added services and applications. Inspired by the Internet’s hourglass architecture — where a minimalistic primitive (IPv4) binds and supports diverse implementations, systems, and applications at the other networking layers — they set out to identify and propose a “social hourglass.” This architecture can capture and aggregate myriad social signals, interpret them, manage the corresponding data, and expose a set of social inference functions for other applications to build on. Their initial proposal is likely just a starting point rather than the ultimate shape a social hourglass will take. Note also that recent studies indicate an evolutionary aspect to the emergence of the Internet’s hourglass architecture. Nonetheless, this article charts the path for convergence in social networking applications.

“Disk Layout Techniques for Online Social Network Data,” by Imranul Hoque and Indranil Gupta, delves into the actual physical infrastructure that supports the rapidly increasing volume of social data managed by OSN service providers. They make an interesting case that existing storage technology has been optimized for workload characteristics that are much different from those encountered in managing social network data. Specifically, they argue that the disk layout must take into account the community structure in a social graph as well as read/write characteristics. Often, OSN service provision results in “write once/read frequently” workloads. To this end, the authors propose a new disk layout technique optimized for read latency. Their layout manager, Bondhu, is integrated with a popular graph database (Neo4j), and the authors demonstrate with experiments a significant performance improvement achieved through disk layout optimization.

In “HorNet: Microblogging for a Contributory Social Network,” Daniel Lázaro, Joan Manuel Marquès, Guillem Cabrera, Helena Rifà-Pous, and Albert Montané present a Twitter-like microblogging system that utilizes end users’ computing resources.

The articles in this issue showcase some of the important frontiers of systems research for realizing better OSN infrastructures, but
many other interesting aspects remain unexplored. For instance, while two of the articles examine OSN infrastructures’ data acquisition, management, and storage aspects, the issue doesn’t cover how one might mine information from such vast amounts of data or take into account the fast pace at which data accumulates and how the information to be inferred itself changes.

As a communication and interaction paradigm, online social networking is in its infancy. The enabling underlying infrastructure must evolve accordingly. An immediate step that we’re already witnessing is a rapid convergence of mobile technology and the still-nascent and evolving cloud computing technologies with social networking applications. This is an interesting time not only for end users but also for the engineers and system designers of such infrastructures. This special issue provides only a small sample of the many things yet to come.

References

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