

It's Used by Us: Family Friendly Access Control

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ABSTRACT

Families often share devices (computers, TVs, music players) and sometimes access to online services (e.g. Netflix). However, we have found through several studies that current access control options, particularly those used for devices, do not well support the sharing common among family members. I describe findings from our studies, some initial approaches to developing family friendly access control options, and argue that it would be valuable to re-think access control for devices and services with families in mind.

Author Keywords

Family, access control, home, computer sharing, mobile phone sharing

ACM Classification Keywords

H5.3. Information interfaces and presentation (e.g., HCI): Group and Organization Interfaces.

General Terms

Human Factors

FAMILY FRIENDLY ACCESS CONTROL

It's time to re-think access control for devices and services with families in mind. When my colleagues and I began investigating how families use and share technology at home [1, 2], it quickly became apparent that there was a mismatch between how families want to share and use devices and digital services, and how these technologies manage permissions and access. Or more concretely, does a computer shared by family members have a single shared account or multiple accounts? Does each family member need a separate account for online services like iTunes, Xbox Live, Netflix, etc.? When a mom hands her phone to a child to play a game, should the child also have access to her email account?

In 2007, my colleague Kori Inkpen and I conducted an interview study where we visited 15 families (50 people) and inquired about their current use and sharing of several different technologies including computers, TVs, phones, music devices, and game consoles [1]. We identified two sharing models that devices and services for the home typically use: the *appliance* and *profile* models. Devices using the appliance model (e.g. TVs, refrigerators, landline phones) allow anyone in the home to use the technology with the same environment and settings and rely on social protocols to handle sharing. For online services this model

corresponds to sharing a single login and password for a service among the entire family (e.g. one Netflix account for your family).

In the profile model, devices support multiple users having customized settings by asking the user to identify (and sometimes authenticate) themselves. Computers in the workplace commonly use the profile model so many computers used in homes including those running the Windows and Macintosh operating systems support profiles. For online services this corresponds to different logins and passwords for different people (e.g. for web email services).

Looking specifically at computer sharing, we found that some households we interviewed used the appliance model and had a single shared account on their computers, while others had multiple profiles configured. Data we analyzed from a later survey of 1,700 households confirmed more generally that households adopted both models. Of 2,750 shared computers, 34% had a single shared profile, 28% had individual profiles for every user, and 38% used some combination of these [2].

Perhaps most interesting was that regardless of the approach chosen, the participants we interviewed described frustrations. For example, those with multiple profiles appreciated individual personalization, but complained about difficulties sharing files. People who shared a single profile liked the convenience and were not worried about privacy, but were disappointed they could not personalize (e.g. with their own background) and that some applications had the wrong settings (e.g. web browsers that stored cookies for other users). In short, although households were managing, we were struck by the fact that neither model fully supported families' desire for intuitive file sharing between family members and lightweight personalization.

Inspired by evidence that current options were not meeting families' needs, we proposed and tested Family Account, a new paradigm for home user accounts [2]. Family Accounts strives to combine the advantages of the appliance and profile models. By default all documents and settings are shared in a family profile, but additional individual profiles can be added to make certain folders and documents private. Switching between profiles does not force users to close applications or otherwise suspend current tasks, so users can start in one profile (e.g. the shared family profile) and then switch to another (e.g. the personal profile) in the middle of the task as needed without having to repeat their

task, unlike previous approaches. See Figure 1. In a lab study, we found that Family Accounts was intuitive without any substantial training, and that our model may provide a tenable compromise between sharing and personalization (dichotomous concepts in the old model) for both users of shared accounts and individual profiles.

While Family Accounts represents one approach to re-thinking user account models for shared home computers, the recent widespread adoption of smart mobile devices and tablets highlights another place where the use of technology by families is not well supported by the security model of a device. The majority of today's phones and tablets use a binary (locked/unlocked) security model that presupposes the phone's owner as the single primary user. However, there are a variety of common situations that motivate people to share their smart phones, particularly with family members and especially to entertain children¹.

To understand security and privacy concerns in current-day phone sharing practices, my colleagues and I conducted interviews with 12 smartphone users in the U.S. [4]. We found sharing was common, fairly informal, and spontaneous, but participants had concerns and strong preferences about what data and functionality should be available to different “guest” users. Concerns about sharing included worries about data privacy, carelessness, and not wanting to confuse non-technical users. All participants wanted a phone security model that could restrict access to data and services when shared, and favorably rated the idea of setting a guest “profile” analogous to setting a ring profile. We believe re-thinking phone security models to handle the common, but often overlooked, practice of phone sharing would better support user needs particularly for sharing with children, and we are in the process of prototyping a variety of designs.

These two examples that we have studied in depth involve device sharing challenges for families, but I believe that another interesting area of investigation is families' use of online services, particularly content providers. For example, in our 2007 study [1], we heard stories of single music service accounts to facilitate sharing of digitally purchased music between siblings (who shared their physical cd's as well). As more and more content including books, movies, and music is purchased in digital form, understanding how services support (or do not support) sharing among family members and whether current approaches meet family needs would be valuable. More generally I hope to learn from others at the workshop about their observations and

¹ Note, in emerging markets phone sharing has long thrived because it makes phone use economical. In this discussion I focus on ad-hoc sharing of a phone that has a primary owner.

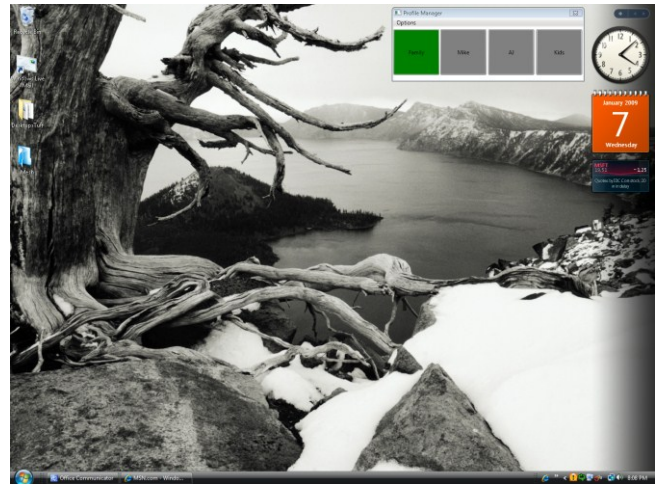


Figure 1a: Family Accounts Example, computer in the Family Profile

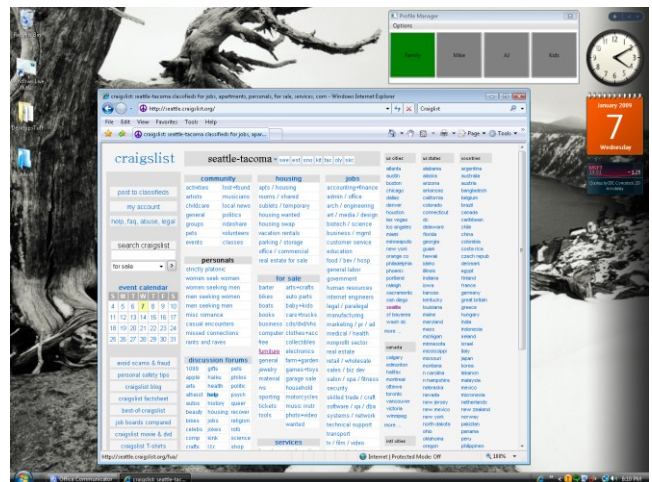


Figure 1b: A.J. walks up and opens a web browser.

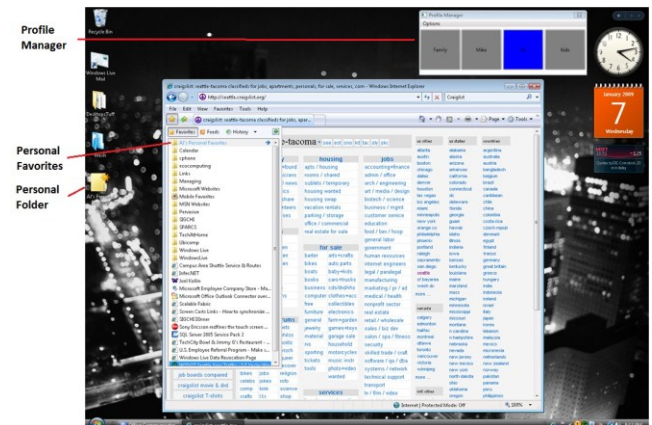


Figure 1c: Switch to Personal Profile. A.J. switches to her own profile by clicking on her name in the profile manager. Her web browser remains and her own favorites appear along with her personal folder and background.

ideas for access control models for devices and services that better support families' needs.

EXPERTISE AND PERSPECTIVE

I have conducted studies and field deployments in homes for the last six years, primarily focusing on family calendaring, sharing technology, and supporting connectedness. My interest in technology for families started with the goal of building a digital family calendar to support family coordination. When my colleagues and I started building the LINC family calendar prototype in 2006 [5, 6], we were certainly not considering issues of family account management or access control. However, deploying the system highlighted to us the interesting "infrastructural" access control challenges in sharing devices in the home and led to our more general exploration of technology sharing in homes and the design of Family Accounts.

As part of MSR's HomeOS project [3], where we are enabling home automation by developing an operating system for the home that provides centralized holistic control of devices in the home, I continue to be fascinated by sharing of devices among family members. Particularly when my own sharing makes me slightly uncomfortable, but I do it anyway. For example, after hearing my son say "what's this mommy?" and finding him in my email program or having my spouse decide he'll help me organize by deleting my old personal email when he finds me logged into webmail on a shared computer (I'm more careful about logging out now!).

CONCLUDING REMARKS

Family members commonly share devices. However, many current access control models do not well support the types of sharing desired by families. For example, computer operating systems force families to choose between a single shared login and multiple profiles, with users finding

drawbacks to both approaches. On the other hand, most smart phones and tablets have adopted a binary locked or unlocked model that means anyone the phone is shared with has complete access. I have described our studies, their implications, and argued for family friendly access control.

ACKNOWLEDGMENTS

I thank my many co-authors with whom I have studied and built technologies for families including Kori Inkpen, Serge Egelman, Carman Neustaedter, Kimberly Tee, Stuart Schechter, Amy Karlson, Marshini Chetty, Ratul Mahajan and the rest of the HomeOS team.

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