A Report on the Munich Internet Research Retreat 2017

ABSTRACT

This article summarizes the two-day Munich Internet Research Retreat (MIR) held in May 2017. The goal of the retreat was to provide a forum for both academic and industrial researchers to exchange ideas and get feedback on their current work. It was organized in a spirit that is similar to highly interactive "Dagstuhl" seminars, with a very limited number of full-length talks, while dedicating most of the time to poster sessions and group discussions. Presentations delivered during the seminar are made publicly available [3].

1. INTRODUCTION

The MIR originated from informal discussions of different research groups at TUM and a team at NetApp on diverse topics related to networking. The discussions brought together PhD students and post-docs to present their respective research (including both work in progress as well as polished results) and provided an informal setting for intense and rich exchange among participants involved. We realised that there was notable potential in reaching out further, which eventually led to the instantiation of the MIR.

The main mission of the MIR is to ensure mutual awareness of different teams working on current (complementary) topics in networking. We want to lay the foundations for establishing, broadening, and deepening cooperation among a variety of groups doing networking research. In order to foster easily sustainable relationships, our initial scope has been deliberately limited to the area around Munich (which may reach as far as 400 km in some cases). As a common denominator, we target like-minded teams within the region, where the common mindset stems from practical research in networked systems, paired with interest and efforts in the Internet Engineering Task Force (IETF), the Internet Research Task Force (IRTF) and the ACM SIGCOMM and SIGMOBILE communities.

The purpose of the MIR is threefold: 1) We seek to provide recurring opportunities for companies to get in touch with research groups that have expertise in fields relevant to the former. 2) We aim to support researchers in understanding current and emerging research and engineering problems from the commercial development and deployment perspectives. 3) We like to offer reality feedback to academic researchers and out-of-the-box ideas to those from industry. Overall, we hope to foster future bi- or multi-lateral collaboration between academics and industry.

The retreat is organized in a highly interactive fashion, combining posters (for providing variety) and group discussions intertwined with plenary talks that stimulate discussions. Organization directions are shaped by the feedback of the participants, keeping the format constantly evolving. We borrow some elements from the renowned Dagstuhl seminars: We limit the number of participants to $\sim$40 to maintain interactivity and allow all participants to meet one another. We hold the retreat in Raitenhaslach away from the daily activities to ensure focus and include an overnight stay and a social dinner to foster continued interaction and allow for digesting ideas. The seminar is by invitation only, and we put an emphasis on the industry, picking PhD students with matching topics, which helps with obtaining a compatible and energetic mix of people. Because we know that everybody's time is scarce, we organize each retreat in a way that it occupies just two days including arrival and departure. With a target of two workshops per year, presently scheduled for May and November, we shall be able to continuously engage with a growing regional community even if individuals cannot participate on every occasion.

Towards this mission, the 1st MIR retreat was organized on November 24–25, 2016 at the TU Munich (TUM) Science and Study Center in Raitenhaslach, Germany. Presentations on topics such as: Software Defined Networks (SDN), Network Function Virtualization (NFV), Information-Centric Networking (ICN), Internet of Things (IoT), Internet measurements and security-related research were solicited. The retreat consisted of ten invited presentations and several posters presenting early and upcoming research, with six breakout sessions to discuss topics of interests in an informal setting. Synopses of these sessions are described in this report in more detail.

2. INVITED PRESENTATIONS

The invited presentations were intended as a basis for triggering discussions and identifying areas for group work.

2.1 Practical Opportunistic Content Dissemination Performance in Dense Network Segments

2.2 Push Away Your Privacy: Precise User Tracking Based on TLS Client Certificate Authentication

2.3 Tentatively: IoT Research Ideas

2.4 Dynamic MultiPath Routing Protocol

2.5 Internet of Things Security: TrustZone for v8-M architecture

3. PARALLEL GROUP WORK

The afternoon sessions were used to discuss selected topics in more depth in smaller groups. This section summarizes the discussions of each group.

4. POSTERS

Participants were encouraged to bring posters to present their recent research work.

4.1 Dynamic MultiPath Routing

4.2 Edge Clouds - Challenges and Solutions

4.3 PASTE: A Networking Interface for Non-Volatile Main Memory

Emerging Non-Volatile Main Memories (NVMMs), also known as storage-class memory and persistent memory push the majority of end-to-end latency that includes durable I/O to network stacks and their APIs. This not only impairs inherent performance of NVMMs that is one to two orders of magnitude faster than traditional persistent medias like SSDs, but prevents systems from adopting them to be reliable with relative ease. Michio Honda (NEC) presented an investigation of this problem, designing an efficient network stack [1] and its APIs, and exploring new opportunities in networking such as software switches and middleboxes in addition to improving networked storage systems.

4.4 Measuring The Performance of Cellular Link From Mobile Users

4.5 Lightweight Virtualization as Enabling Technology forFuture Smart Cars

Modern vehicles are equipped with several interconnected sensors on board for monitoring and diagnosis purposes; their availability is a main driver for the development of novel applications in the smart vehicle domain. Roberto Morabito [2] presented a Docker container-based platform as solution for implementing customized smart car applications. Through a proof-of-concept prototype—developed on a Raspberry Pi3 board—we show that a container-based virtualization approach is not only viable but also effective and flexible in the management of several parallel processes running on On-Board Unit. More specifically, the platform can take priority-based decisions by handling multiple inputs, e.g., data from the CANbus based on the OBD II codes, video from the on-board webcam, and so on. Results are promising for the development of future in-vehicle virtualized platforms.

4.6 Data-driven Mobility Modeling

4.7 iConfig - What I See is What I Configure

Michael Haus (TU Munich) presented iConfig to manage IoT devices in smart cities. The management of IoT devices in urban areas is becoming important due to that the majority of the people living in cities and the number of deployed IoT devices are increasing. Therefore, iConfig addresses three major issues in current IoT management: registration, configuration, and device maintenance. To achieve the goals of iConfig, the presented system relies on programmable edge modules, which can run on smartphones, wearables, and smart boards to configure physically proximate IoT devices.

4.8 Practical Opportunistic Content Dissemination Performance in Dense Network Segments

4.9 Recommender Systems and Mobility Services

Recommender systems (RSs) in tourism often recommend single Points of Interests (POIs) such as restaurants or museums. However, tourists visiting a destination are usually looking for a tourist trip composed of multiple POIs along a practical route. Daniel Herzog (TU Munich) presented a **RS!** (**RS!**) [5] recommending tourist trips to a group of users. This is a particularly complex problem as the **RS!** has to aggregate the travel preferences of all group members before wgenerating recommendations. Furthermore, we want to research how different devices and user interfaces can support groups in providing feedback on recommendations and finding a consensus.

4.10 Hybrid Solutions for Data Dissemination in Vehicular Networks

Lars Wischhof (Hochschule Müncher) presented an architecture and preliminary results of an on-going research project at the research group where communication schemes combining cellular communication with direct-communication (such as Device-to-device (D2D) modes of the latest LTE-A releases or LTE-V) are combined for applications in intelligent mobility. The basic assumption is that future vehicles will most-likely have multiple communication technologies and modes available. Therefore, a context-aware selection of the communication mode is advocated. A suitable architecture is outlined. First simulation results for the example of a DENM-based application indicate that a context-aware selection can outperform a static assignment.

4.11 Accountability for Cyber-Physical Systems

Severin Kacianka (TU Munich) seeks to capture the essential features of an accountable (computer-)system. Logs are, for example, a common way to create evidence and establish "truth" in computer systems. Another facet are mechanisms to process those logs and techniques to formulate the questions of compliance with laws as queries against those logs. However, there are currently no "blue prints" on how to make a system "accountable". We wish to develop a comprehensive framework that makes it possible to explicate the accountability features of a system, reason about their effectiveness, compare it to other solutions and offer options to exchange one specific component for another.

5. CONCLUSIONS AND NEXT STEPS

The 1st Munich Internet Research retreat concluded successfully on November 24–25, 2016. All the presentation material and contact information of presenters are available online [3]. A second iteration of the retreat is planned for May 23–24, 2017 with a webpage currently available online [4]. The readers are encouraged to contact the organizers to learn more about the the next retreat.

We also collected some feedback from the participants. Academic participants expressed that this retreat was a good chance to talk to fellow researchers, although the topics were quite diverse. While the 1st retreat was open in terms of topics (as will be the upcoming 2nd retreat), we are considering running workshops focused on topic areas as an option for the future. Industrial participants found the breakout sessions useful since it helped them to get an overview of current academic research. It was mentioned that such an interaction also helps bring some of the academic research back to the industry. Longer breakout sessions (by reducing the number of invited presentations) and dedicated sessions for doctoral candidates were advised. The idea of inviting more industry participants was also suggested.

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