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Computation Migration Oriented Resource Allocation in Mobile Social Clouds

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ABSTRACT: In current computing environments, collaborative computing has been a central concern in Ubiquitous, Convergent, and Social Computing. The leading projects for representing daily life services and their systems. Require complicate and collaborative network systems. The collaborative computing environments remain in high potential risks for users' security and privacy because of diverse attack routes. In order to solve the problems, we design combined authentication and multilevel access control, which deals with cryptographic methods in a personal database system. We propose a scheme which is flexible in dynamic access authorization changes, secure against all the attacks from various routes, a minimum round of protocol, privacy preserving access control, and multifunctional. Mobile ad hoc networks (MANETs) are ideal for situations where a fixed infrastructure is unavailable or infeasible. Today's MANETs, however, may suffer from network partitioning. This limitation makes MANETs unsuitable for applications such as crisis management and battlefield communications, in which team members might need to work in groups scattered in the application terrain. In such applications, intergroup communication is crucial to the team collaboration. To address this weakness, we introduce in this paper a new class of ad-hoc network called Autonomous Mobile Mesh Network (AMMNET). We propose a distributed client tracking solution to deal with the dynamic nature of client mobility, and present techniques for dynamic topology adaptation in accordance with the mobility pattern of the clients. Our simulation results indicate that AMMNET is robust against network partitioning and capable of providing high relay throughput for the mobile clients.

KEYWORDS*:* Mobile social cloud; Mobile edge computing; Multi-objective Optimization; Resource allocation; Computation migration.

I. INTRODUCTION

DUE to the rapid development of Internet technologies, the mobile terminal devices (e.g., smart phone, smart bracelet, etc.) are becoming more and more powerful, while their sizes are becoming smaller. This trend actually limits the computing capacity of some mobile devices. However, customers' expectations on these devices grow continuously. For example, customers would demand faster task computing and data processing than before. In this way, the contradiction between customer requirement and device capacity would inevitably cause performance and technical bottlenecks. The cloud computing technology can alleviate such situation by executing computation-intensive tasks on remote high performance servers (e.g., public clouds). Nevertheless, migrating the tasks from mobile device to remote cloud would occupy a lot of core network bandwidth resource and the long path between them means a long delay that may not be accepted by customers. Now, with the popular of Mobile Edge Computing (MEC) technologies, the computing and storage capacities are sinking to the network edge. Then, instead of migrating computation-intensive tasks to the remote cloud via core network, they can be directly migrated to the local server for processing, which saves a lot of transmission time. This pattern can relieve the bandwidth burden of the transmission network and reduce the response time. Hence, this pattern can be applied among mobile devices by migrating the com-putting task from one device to another. However, it is aware that the location of mobile devices randomly changes with the requirements of customers, during which the network connection among mobile devices may break and then lead to unexpected results. In this regard, Mobile Social Cloud (MSC), as the integration of Mobile Social Network (MSN) and cloud, can offer scalable, elastic and stable cloud computing and storage services to mobile devices at edge by forming a social network among them, which not only decreases the consumption of bandwidth resource, but also reduces the network delay and

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jitter. The computation migration oriented resource allocation is mainly considered to explain how the social cloud is formed and utilized. The composed of the social network and the social cloud platform. On one hand, the social network consists of many mobile devices in the same community, which can be classified into two categories. The first kind has rich resource with a small number of computing tasks, while the second kind has poor resource with a large number of computing tasks. On the other hand, the social cloud platform maintains a virtual resource pool that has two boundaries. The first boundary is between the resource supplier and the resource pool, while the second boundary is between the resource demander and the resource pool. Firstly, the resource suppliers contribute to the virtual resource pool maintained by the social cloud platform. Secondly, the resource demanders request resource from this resource pool with the help of the social cloud platform. Finally, the social cloud platform is regarded as the resource agent that tries to reach a balance between the resource demander and supplier.

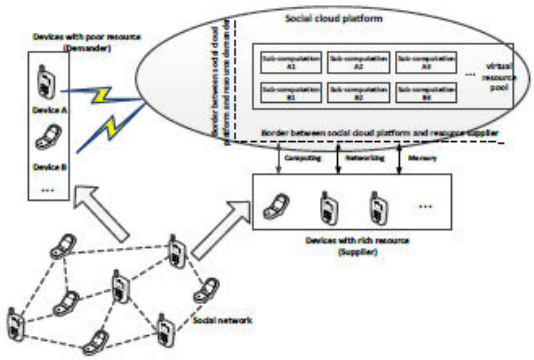

Fig 1 System Architecture

II. LITERATURE REVIEW

We compare the efficacy of animated and small multiples variants of scatter plots on mobile phones for comparing trends in multivariate datasets. Visualization is increasingly prevalent in mobile applications and mobile-first websites, yet there is little prior visualization research dedicated to small displays. In this paper, we build upon previous experimental research carried out on larger displays that assessed animated and non-animated variants of scatter plots. Incorporating similar experimental stimuli and tasks, we conducted an experiment where 96 crowd worker participants performed nine trend comparison tasks using their mobile phones. We found that those using a small multiples design consistently completed tasks in less time, albeit with slightly less confidence than those using an animated design. The accuracy results were more task-dependent, and we further interpret our results according to the characteristics of the individual tasks, with a specific focus on the trajectories of target and distract or data items in each task. We identify cases that appear to favor either animation or small multiples, providing new questions for further experimental research and implications for visualization design on mobile devices. Lastly, we provide a reflection on our evaluation methodology.

Fully codified mobile network infrastructure, which is featured by the joint deployment of heterogeneous cloud radio access networks and edge computing, will successfully cope with the data deluge by densely deploying virtualized wireless base stations and servers while providing the system design with high flexibility, reliability, availability, and scalability. On the other hand, the massive replication of the wireless and computing infrastructure will significantly increase the energy footprint to prohibitive levels. In order to gain actionable insights on energy-efficiency for a fully codified mobile network infrastructure, this paper first presents a comprehensive survey of the recent research breakthroughs on each building block of the system, namely: remote radio heads, baseband unit pool, front haul, backhaul, Het Net, and edge and cloud computing. Next, we consolidate the discussion with the challenges and open issues of a joint operation.

For the load balancing of the whole cloud computing architecture, we need to use the virtual machine's dynamic online migration technology. Based on TCCP model, this article improves the trusted third-party coordinator, and migrates partial management of TC to node TN to prevent the TC leakage which may cause the security of the whole model to be destroyed. At the same time, to ensure the integrity of the online migration, the trusted computing module provides a complete trust measure, stores the measurement value, and constructs a complete trusted chain,

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providing a platform to guarantee the remote verification of the migration. Finally, through the integrity measurement and verification function provided by TPM, measurement and validation are performed before the virtual machine starts migration, to ensure the integrity of the migration. Multi-access edge computing (MEC) is an emerging ecosystem, which aims at converging telecommunication and IT services, providing a cloud computing platform at the edge of the radio access network. MEC offers storage and computational resources at the edge, reducing latency for mobile end users and utilizing more efficiently the mobile backhaul and core networks. This paper introduces a survey on MEC and focuses on the fundamental key enabling technologies. It elaborates MEC orchestration considering both individual services and a network of MEC platforms supporting mobility, bringing light into the different orchestration deployment options. In addition, this paper analyzes the MEC reference architecture and main deployment scenarios, which offer multi tenancy support for application developers, content providers, and third parties. Finally, this paper overviews the current standardization activities and elaborates further on open research challenges.

The incoming era of the fifth-generation fog computing-supported radio access networks (shortly, 5G FOGRANs) aims at exploiting computing/networking resource virtualization, in order to augment the limited resources of wireless devices through the seamless live migration of virtual machines (VMs) toward nearby fog data centers. For this purpose, the bandwidths of the multiple wireless network interface cards of the wireless devices may be aggregated under the control of the emerging Multi Path TCP (MPTCP) protocol. However, due to the fading and mobility-induced phenomena, the energy consumptions of the current state-of-the-art VM migration techniques may still offset their expected benefits. Motivated by these considerations, in this paper, we analytically characterize and implement in software and numerically test the optimal minimum-energy settable-complexity bandwidth manager (SCBM) for the live migration of VMs over 5G FOGRAN MPTCP connections. The key features of the proposed SCBM are that: 1) its implementation complexity is settable on-line on the basis of the target energy consumption versus implementation complexity tradeoff; 2) it minimizes the network energy consumed by the wireless device for sustaining the migration process under hard constraints on the tolerated migration times and downtimes; and 3) by leveraging a suitably designed adaptive mechanism, it is capable to quickly react to (possibly, unpredicted) fading and/or mobility-induced abrupt changes of the wireless environment without requiring forecasting. The actual effectiveness of the proposed SCBM is supported by extensive energy versus delay performance comparisons that cover: 1) a number of heterogeneous 3G/4G/WiFi FOGRAN scenarios; 2) synthetic and real-world workloads; and, 3) MPTCP and wireless connections.

In a cloud computing environment, datacenter consists of number of servers, cooling and power delivery equipment's that require enormous measure of computational energy to drive complex frameworks. Due to the rising demand of the computation power, datacenter has become the hub for significant increase in the power consumption, heat dissipation and rise in temperature of the servers. Cloud datacenter's energy consumption has increased tremendously due to increase in the computation requirements of the user workload. Thus, saving energy has become an important concern to address. Researchers proposed different techniques to optimize the energy consumption. In this paper, we focus on different aspects of cloud computing for holistic management of cloud resources in an energy-efficient, reliable and sustainable manner. We recognized different opportunities, identified research challenges and propose possible future research directions for cloud computing.

Field-Programmable Gate Arrays (FPGAs) are becoming important components within commercially available cloud computing systems. However, the FPGAs are not yet sufficiently abstracted within existing software ecosystems. Contrary to how applications are transparently scheduled across general purpose processors, software processes need to explicitly provision and control communications with hardware circuits within the FPGAs. In this paper, we introduce a novel virtualization framework called FPGAVirt that leverages Virtio to implement an efficient communication scheme between virtual machines and the FPGAs. FPGAVirt avoids the overhead of context switches between virtual machine and host address spaces by using the in-kernel network stack for transferring packets to FPGAs. Experimental results show FPGAVirt can deliver an additional 2x to 35x performance increase compared to current state of the art virtualization approaches.

Mobile Mesh Social Network (MMSN) represents an environment where the mobile device users are capable of performing various virtual social network activities such as sharing information, forming social groups, text messaging when they encounter each other in the physical vicinity within the wireless network range. Moreover, the characteristics of MMSN such as the Internet less activities and Wireless Mesh Network (WMN)-based connectivity provides various potentials including but not limited to business opportunities, scalable crowd sourcing or crowd sensing deployment, edge computing and so on. Although there exist a fair number of software platforms that help developers to implement MMSN, they still cannot fully overcome the limitation derived from the hardware resource constraint nature of the participative mobile devices. In order to enhance the MMSN in terms of cost efficiency, we introduce Fog Social Network (FSN) model, which utilizes the computing and networking resources in users' close

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vicinity to improve the overall efficiency of MMSN. Further, the proposed FSN framework consists of an adaptive resource-aware cost-performance index (CPI) scheme, which performs dynamic approach selection autonomously at runtime to choose the most efficient route for the delivery of the messages for MMSN activities. With this intention, we have implemented and validated a proof-of-concept prototype.

III. METHODOLOGIES

In this paper, we introduce the rapid development of Internet technologies; the mobile terminal devices (e.g., Smartphone, smart bracelet, etc.) are becoming more and more powerful, while their sizes are becoming smaller. This trend actually limits the computing capacity of some mobile devices. However, customers' expectations on these devices grow continuously. We propose a distributed client tracking solution to deal with the dynamic nature of client mobility, and present techniques for dynamic topology adaptation in accordance with the mobility pattern of the clients. Our simulation results indicate that AMMNET is robust against network partitioning and capable of providing high relay throughput for the mobile clients. Since this mobile infrastructure follows the users, full connectivity can be achieved without the need and high cost of providing network coverage for the entire application terrain at all time as in traditional stationary infrastructure.

- Forward data for mobile clients along the routing paths built by any existing ad hoc routing protocols.
- Robust against network partitioning and capable of providing high relay throughput for the mobile clients.
- It is very high network security
- It is user friendly

MANET

A MANET, which stands for mobile ad hoc network, is defined as a collection of low-power wireless mobile nodes forming a temporary wireless network without the aid of any established infrastructure or centralized administration. A wireless ad hoc network or mobile ad hoc network is a decentralized type of wireless network. The network is ad hoc because it does not rely on a pre-existing infrastructure, such as routers in wired networks or access points in wireless networks. Some MANETs are restricted to a local area of wireless devices such as a group of laptop computers, while others may be connected to the Internet. For example, A VANET Vehicular Ad Hoc Network is a type of MANET that allows vehicles to communicate with roadside equipment. Bandwidth-constrained and variable capacity links: wireless links continue to have significantly lower capacity than infrastructure networks. Energy-constrained operation: some or all of the MSs in a MANET may rely on batteries or other exhaustible means for their energy. What are advantages of MANET each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. The main classes of MANET routing protocols are Proactive, Reactive and Hybrid. MANETs have self-organized topology in which mobile nodes are free to move, as a result establishing a stable and reliable network is a difficult and critical task. Nodes in Nobile Ad-hoc network acts as sender. Comparative Study of Two Reactive Routing Protocols with Realistic Mobility Model.

MOBILE SOCIAL CLOUD

Mobile and cloud is the convergence of collaborative, on-the-go technologies that allow users to access data and applications from anywhere at any time. SMAC (social, mobile, analytics and cloud) is the concept that the convergence of four technologies is currently driving business innovation. SMAC is the basis for an ecosystem that enables a business to transition from e-business to digital business. SMAC is a digital architecture based on the convergence of four diverse technologies; Social media, Mobility, Analytics and Cloud computing. The mobile cloud is Internet-based data, applications and related services accessed through smart phones, laptop computers, tablets and other portable devices. Mobile cloud computing is differentiated from mobile computing in general because the devices run cloud-based Web apps rather than native apps. SMAC means: social, mobile, analytic, and cloud. With a business model and value drivers that seduce readers, you can use SMAC-based digital marketing to: Improve the cost and value of your products and services

IV. ALGORITHMS

REVERSE AUCTION ALGORITHM

A reverse auction is a strategy used in sourcing between buyers and suppliers in which sellers compete with one another to win the business of the buyer. It is called a reverse auction because prices trend down as the bidding

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goes on, rather than up, as they would in a typical auction. Reverse auctions are eAuctions where suppliers submit online bids to compete against each other. Unlike forward auctions, where bids increase as the auction progresses, in reverse auctions, bidding starts with the highest possible price and decreases gradually. The lowest bid wins. A reverse auction only deals with lowering of prices. It does not give information on other costs involved in a contract. This may lead a buyer to choose a seller who offers an apparently low price but who provides poor quality product, high cost of delivery or poor customer services.

PRIVACY PRESERVING ACCESS CONTROL

Privacy Preserving Data Mining (PPDM) techniques are being developed to allow information to be extracted from data without disclosing sensitive information. There is no single optimal PPDM technique for any stage of the data lifecycle. Privacy-preserving data mining is an application of data mining research in response to privacy security in data mining. It is called a privacy-enhanced or privacy-sensitive data mining. It deals with obtaining true data mining results without disclosing the basic sensitive data values. Access control is a security technique that regulates who or what can view or use resources in a computing environment. It is a fundamental concept in security that minimizes risk to the business or organization.

V. CONCLUSIONS

This work focuses on addressing the computation migration oriented resource allocation problem in mobile social clouds. Specifically, we first construct a resource allocation framework for mobile social cloud, based which a multi-objective model is formulated, including the minimization of energy consumption, delay and cost, and the maximization of social profits. After that, a decomposition and dominance based algorithm is proposed to efficiently address this formulated multi-objective model. Finally, we also introduce the parallel computing strategies to optimize the proposed algorithm. The experimental results indicate that the proposed algorithm can achieve better performance in the mobile edge computing scenario by establishing a better balance among mobile edge devices. The introduction of parallel computing improves the calculation effiency and may better adapt to a distributed edge computing environment. The future research includes verifying the performance of the proposed algorithm in 5G/B5G/6G edge-cloud cooperation scenario and exploring the dependence relationship among different computation tasks in a distributed manner.

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