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Remote Server Cloud to Store Data through Topologies

Rongala Ravi
Department of Computer Science & Engineering,
Eluru College of Engineering and Technology.

ABSTRACT:
Despite the advances in hardware for hand-held mobile devices, resource-intensive applications (e.g., video and image storage and processing or map-reduce type) still remain off bounds since they require large computation and storage capabilities. Recent research has attempted to address these issues by employing remote servers, such as clouds and peer mobile devices. For mobile devices deployed in dynamic networks (i.e., with frequent topology changes because of node failure/unavailability and mobility as in a mobile cloud), however, challenges of reliability and energy efficiency remain largely unaddressed. To the best of our knowledge, we are the first to address these challenges in an integrated manner for both data storage and processing in mobile cloud, an approach we call k-out-of-n computing. In our solution, mobile devices successfully retrieve or process data, in the most energy-efficient way, as long as k out of n remote servers are accessible. Through a real system implementation we prove the feasibility of our approach. Extensive simulations demonstrate the fault tolerance and energy efficiency performance of our framework in larger scale networks.

INTRODUCTION:
Personal mobile devices have gained enormous popularity in recent years. Due to their limited resources (e.g., computation, memory, energy), however, executing sophisticated applications e.g., video and image storage and processing, or map-reduce type) on mobile devices remains challenging. As a result, many applications rely on offloading all or part of their works to remote servers" such as clouds and peer mobile devices. For instance, applications such as Google Goggle and Siri process the locally collected data on clouds.

Going beyond the raditional cloud based scheme, recent research has proposed to offload processes on mobile devices by migrating a Virtual Machine (VM) overlay to nearby infrastructures [1], [2], [3]. This strategy essentially allows offloading any process or application, but it requires a complicated VM mechanism and a stable network connection. Some systems (e.g., Serendipity [4]) even leverage peer mobile devices as remote servers to complete computation intensive job. In dynamic networks, e.g., mobile cloud for disaster response or military operations [5], when selecting remote servers, energy consumption for accessing them must be minimized while taking into account the dynamically changing topology. Serendipity and other VM-based solutions considered the energy cost for processing a task on mobile devices and offloading a task to the remote servers, but they did not consider the scenario in a multi-hop and dynamic network where the energy cost for relaying/transmitting packets is significant.

Furthermore, remote servers are often inaccessible because of node failures, unstable links, or node-mobility, raising a reliability issue. Although Serendipity considers intermittent connections, node failures are not taken into account; the VM-based solution considers only static networks and is difficult to deploy in dynamic environments. In this article, we propose the first framework to support fault-tolerant and energy-efficient remote storage & processing under a dynamic network topology, i.e., mobile cloud. Our framework aims for applications that require energy-efficient and reliable distributed data storage & processing in dynamic network. E.g., military operation or disaster response. We integrate the k-out of- n reliability mechanism into distributed computing in mobile cloud formed by only mobile devices. k-out-of- n, a well-studied topic in reliability control [6], ensures that a system of n components operates correctly as long as k or more components work. More specifically, we investigate how to store data as well as process the stored data in mobile cloud with k-out-of-n reliability such that: 1) the energy consumption for retrieving distributed data is minimized; 2) the energy consumption for processing the distributed data is minimized; and 3) data and processing are distributed considering dynamic topology changes. In our proposed framework, a data object is encoded and partitioned into n fragments, and then stored on n different nodes. As long as k or more of the n nodes are available, the data object can be successfully recovered. Similarly, another set of n nodes are assigned tasks for processing the stored data and all tasks can be completed as long as k or more of the n processing nodes finish the assigned tasks. The parameters k and n determine the degree of reliability and different (k, n) pairs may be assigned to data storage and data processing. System administrators select these parameters based on their reliability requirements. The contributions of this article are as follows:

• It presents a mathematical model for both optimizing energy consumption and meeting the fault tolerance requirements of data storage and processing under a dynamic network topology.
• It presents an efficient algorithm for estimating the communication cost in a mobile cloud, where nodes fail or move, joining/leaving the network.
• It presents the first process scheduling algorithm that is both fault-tolerant and energy efficient.
• It presents a distributed protocol for continually monitoring the network topology, without requiring additional packet transmissions.
• It presents the evaluation of our proposed framework through a real hardware implementation and large scale simulations. The article is organized as follows: Section 2 introduces the architecture of the framework and the mathematical formulation of the problem. Section 3 describes the functions and implementation details of each component in the framework.

In section 4, an application that uses our framework (i.e., a mobile distributed file system – MDFS) is developed and evaluated. Section 5 presents the performance evaluation of our k-out-of- n framework through extensive simulations. Section 6 reviews the state of art. We conclude in Section 7.

EXISTING SYSTEM:

- ❖ When selecting remote servers, energy consumption for accessing them must be minimized while taking into account the dynamically changing topology.
- ❖ Serendipity and other VM-based solutions considered the energy cost for processing a task on mobile devices and offloading a task to the remote servers, but they did not consider the scenario in a multi-hop and dynamic network where the energy cost for relaying/transmitting packets is significant.

Disadvantages of Existing System:

- ❖ The V-M based solutions did not consider the scenario in a multi-hop and dynamic network where the energy cost for relaying/transmitting packets is significant.
- ❖ Most of these works focus on minimizing the energy, but do not address system reliability.

PROPOSED SYSTEM:

- ❖ We propose the first framework to support fault-tolerant and energy efficient remote storage & processing under a dynamic network topology, i.e., mobile cloud.
- ❖ Our framework aims for applications that require energy-efficient and reliable distributed data storage & processing in dynamic network. E.g., military operation or disaster response.
- ❖ We integrate the k-out of- n reliability mechanism into distributed computing in mobile cloud formed by only mobile devices. k-out-of- n, a well-studied topic in reliability control, ensures that a system of n components operates correctly as long as k or more components work.

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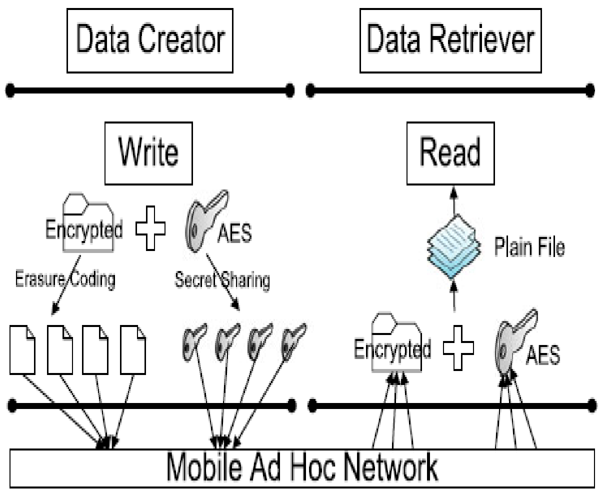
Advantages of Proposed System:

- ✓ Extensive simulations in larger scale networks proved the effectiveness of this solution.
- ✓ It assigns data fragments to nodes such that other nodes retrieve data reliably with minimal energy consumption.

SYSTEM ARCHITECTURE:



IMPLEMENTATION MODULES:

- ❖ Dataset Collection
- ❖ Preprocessing Method
- ❖ Feature Selection/ Instance Selection
- ❖ Bug Data Reduction
- ❖ Performance Evaluation

MODULES DESCSRIPTION:

- **Data Owner:**

In this module, the data owner uploads their data in the cloud server. For the security purpose the data owner splits file to four packets, encrypts the data file and then store in the multiple clouds cloud. The Data owner can have capable of manipulating the encrypted data file.

- **Cloud Server:**

The cloud service provider manages a cloud to provide data storage service. Data owner encrypts and splits the data files and store them in the multiple clouds (cs1, cs2, cs3 and cs4) for sharing with data consumers. To access the shared data files, data consumers download encrypted data files of their interest from the cloud and then decrypt them.

- **Network Router:**

Topology Discovery is executed during the network initialization phase or whenever a significant change of the network topology is detected (as detected by the Topology Monitoring component). During Topology Discovery, one delegated node floods a request packet throughout the network based on the number of task assigned. Upon receiving the request packet, nodes reply with their neighbor tables and failure probabilities. Consequently, the delegated node obtains global connectivity information and failure probabilities of all nodes. This topology information can later be queried by any node.

- **Data Consumer(End User):**

In this module, the user can only access the data file with the encrypted key to access the file. Then The NC cloud combines all the packets and sends to Remote user. Users may try to access data files within the cloud only.

CONCLUSION:

We presented the first k-out-of-n framework that jointly addresses the energy-efficiency and fault-tolerance challenges. It assigns data fragments to nodes such that other nodes retrieve data reliably with minimal energy consumption. It also allows nodes to process distributed data such that the energy consumption for processing the data is minimized. Through system implementation, the feasibility of our solution on real hardware was validated. Extensive simulations in larger scale networks proved the effectiveness of our solution.

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