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Saba Journal of Information Technology and Networking (SJITN)

Review

Routing Protocols in Mobile Ad-hoc Networks

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Abstract

Mobile Ad hoc networking is a concept that is considered as a collection of nodes which connect with each other without any aid of centralized administration or constant infrastructure. The nodes which connect in mobile Ad hoc network can be laptops and/or any personal digital assistants, which are often limited resources; such as CPU capacity, storage capacity, battery power and bandwidth. In MANET there are lots of challenges that may affect the process of connection between the nodes. One of these challenges is routing protocols through the communication between nodes, and because of the dynamic movement of nodes, the process of routing will be more difficult .The concept of routing protocols in Mobile Ad hoc network is the way of sending and receiving the packets between the source and the destination. In general the routing protocols are classified into three types. These are; proactive routing protocols, reactive protocols and lastly hybrid routing protocols. All routing protocols are used to manage, the process of routing through the connection of nodes in the MANET. In this paper we discuss the descriptions of different routing protocols in mobile Ad hoc networks.

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1. Introduction

MANET [1] is a group of mobile nodes that communicate with each other independently by radio waves. The mobile nodes which are in domain of a radio can be communicated with each other directly, while others need the help of intermediate nodes to route their packets. In MANET the node connects with other nodes directly without any aid of centralized administration or constant infrastructure like a base station or an access point. As shown in the (Figure 1) the node 2 will be in the middle range between two nodes 1 and 3, both nodes cannot connect with each other directly because they are not located in the same range, so the node 2 will be a common node that allows nodes 1 and 2 to connect with each other. Node 2 in this situation can be considered as a router and these three nodes altogether compose an Ad-hoc network.

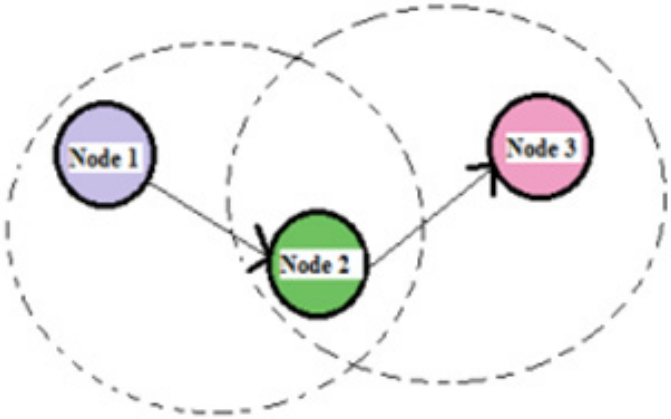

Fig. 1 Example of mobile ad-hoc network

2. Classification Of Current Routing Protocols

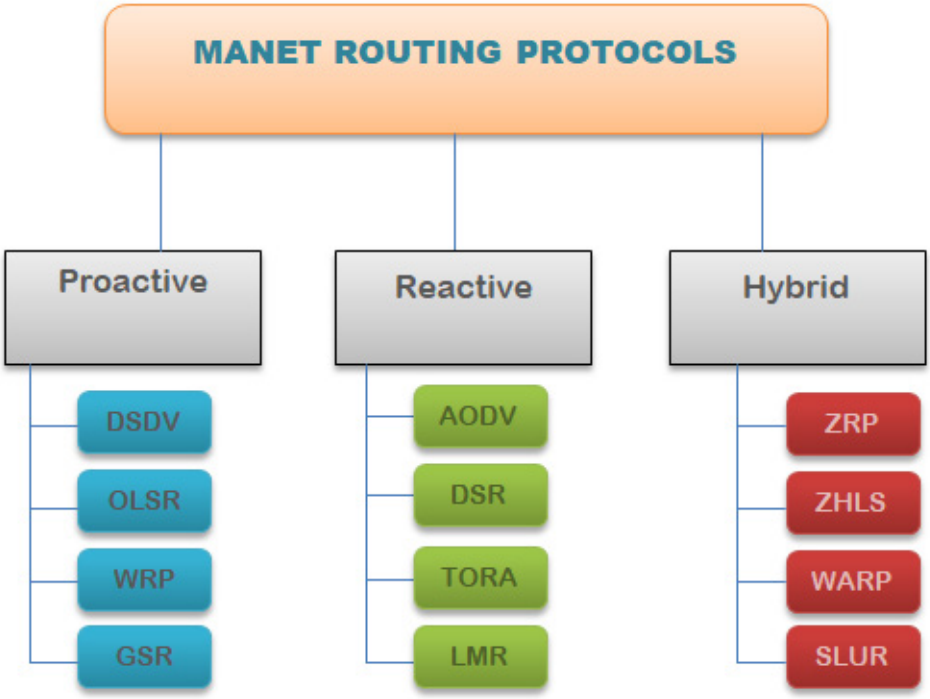

Fig. 2: Classification of routing protocols

A routing protocol [2] will be required when the source needs to transfer the data packet to the destination, by the intermediate nodes. There are many protocols proposed for this kind of communication through the Ad hoc network. The routing protocol is used to find the optimal path and deliver the packet data to the right destination. The study of different routing protocols in mobile Ad hoc network became very active in the process of research for many years. As shown in (Figure 2) there are three types of routing protocols in MANET and which can broadly be classified as [3].

2.1 Proactive routing (Table-Driven) Protocols

In these protocols, the nodes will update the routing information continuously within a network. Each node preserves the entire topology of the network and has the ability to connect with any other node. The routing information table in each node will be updated regularly, so the necessity of routing is required, and the path will be known already. When any node requires the communication with other nodes, the connection throughout the network will be available, and that will make a short latency. When there are a lot of nodes movements in the network, maintaining the route information in the topology will be high.

2.2 Reactive Routing (On-Demand) Protocols:

Unlike the proactive routing, the reactive routing protocols collect the information of route whenever it is required. The route decision will be taken depending on the source, when the source sends the Route Request throughout the network. So whenever the source needs the path of destination, it sends the request query and finds the destination in the network. The destination sends the query back to the source, and this process will make a high latency, however, no important control messages are required.

2.3 Hybrid routing Protocols:

These protocols commingle the terms of proactive and reactive routing protocols as well. The nodes in the network will be collected into zones based on the distance from each other or geographical locations. The routing in the single zone will be held using proactive mechanism, while reactive routing will be utilized for routing beyond the zone limits.

3. Description Of Proactive Protocols

3.1 Proactive Routing Protocols

The nodes in the network [4] contain their own routing tables, and each node broadcasts the data packet as well as starts the establishment connection, with all other nodes throughout the topology of network. Each node maintains the presented destination of all other nodes in the network and has the ability to connect with them; numbers of hops are required to reach the destination in the routing table. The proactive protocols are: Destination-sequenced distance vector (DSDV), Wireless routing protocol (WRP), Global state routing (GSR), and Fish eye state routing (FSR).

3.2 Destination-sequenced distance vector (DSDV)

DSDV [5] is a proactive routing protocol for MANET, and it is used to find a single path from the host to the destination based on an Algorithm called Bellman-Ford. This algorithm helps to disband the issue of the routing loop in the network. Each node in the network saves its own routing table. The Content of the routing table in DSDV contains the destination number of hops and the sequence number produced by the destination. The DSDV routing protocol requires all nodes in the topology of the network to share their routing table with each other. The process of sharing can be by broadcasting or multicasting. When they communicate with each other, each node will be able to determine the other routing tables and have a chance to connect with them, and any update that might occur in the topology of network will be maintained in the routing table of each node.

3.3 Optimized Link State Routing (OLSR)

The OLSR [6] is improvement of the clear link state protocols that decreases the size of control packets as well as the number of control packet transmissions required. The key notion of OLSR is the Multipoint Relays (MPRs); this concept in OLSR is used to diminish the control of traffic overheads. The connotation of Multipoint Relays is a node's one-hop neighbor which has been chosen to forward packets, instead of clear overflowing of the network, the packets are sent by the nodes MPRs. That will restrict the overhead in the network and make it be more efficacious

than clear link state routing protocols. The usage of MPRS in the OLSR will give it the ability to be convenient for large and intense mobile networks.

3.4 Wireless routing protocol (WRP)

WRP [7] is considered as a proactive routing protocol because it saves distance table, routing table, link cost table, and lastly maintains message transmission list (MRL) to avert the looping of a provisional routing. The WRP routing protocol uses the process of updating message transmission to neighbor nodes. When the node has the update, it should inform others in the network as well as forward an acknowledgement. The node can only have a chance to make the decision; whether to update or not, after receiving the update message from the neighbor. The WRP routing protocol is also used to select the best path from the source to destination. When the node finds the best path, it sends the reply message, then, the source will update its message transmission list (MRL).

3.5 Global state routing (GSR)

In GSR protocol [8] the idea is comparable to the DSDV routing protocol. The GSR is based on link state routing protocol, but the distinction is that the GSR protocol progresses by evading the overflow of routing messages. Each node in GSR routing algorithm preserves a Neighbor list, a Topology table, a Next Hop table, and a Distance table. The list of Neighbor in each node will contain the list of its Neighbors as well. The destination of each node of the topology table will contain the information of link state as notified by the destination, and the time stamp of information. Within each node destination in the network, the next hop table contains the next hop to which the packets for this destination must be transmitted.

4. Description Of Reactive Protocols

4.1 Reactive Routing Protocols

Reactive routing protocols [9] are designed to defeat the wasted effort in maintaining routes that are unused. The routing discovery will initiate when there is need for it, and will save the overhead of maintaining unused routes at each node. On the other hand, the latency forwarding data packets will increase. Reactive routing protocols overflow through the topology of networks until a destination is found. They are not perfect in term of bandwidth utilization, but they are scalable in the frequency of topology change. This strategy is appropriate for High Mobility networks.

These protocols [10] act when the host sends the date through the network topology. The first step will be taken by the decision procedure to the destination node, and connection will be established between the nodes to take the decision procedure. The source node will request the packet by overflow through the topology of network. The overflowing process is a dependable method of spreading the information over the network. Some of the reactive protocols are: Ad hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA),Light-weight mobile routing (LMR),Associativity-based routing (ABR),Signal stability adaptive (SSA),Location-aided routing (LAR), and Ant-colony-based routing algorithm (ARA).

4.2 Ad hoc On-Demand Distance Vector (AODV)

AODV [11] is a combination of DSDV and DSR. It is the process of sharing the feature of route discovery in DSR, to find the path of destination .AODV selects conventional routing tables; one entry per destination but in the DSR there is contrast because it preserves multiple route cache entries for each destination. The design of AODV was early undertaken after experiment with DSDV protocol. When the link is broken in the network, the AODV provides free loop route like DSDV but AODV doesn't need global route advertising periodically. The AODV routing algorithm discovers the route of the destination and then receives a unicast reply route message.

4.3 Dynamic Source Routing (DSR)

DSR [12] is a reactive routing protocol which is based on the source routing. The source broadcasts the packet to its neighbors that by turn forward the packet to the next hop until it reaches the destination. The DSR depends on two processes: the first one is routing discovery. When the source wants to find the path to destination, it initially checks the route cache. If the path of destination is not available in the route cache,

then a source node will start the process of route discovery again to find the optimal destination. If a source knows the Packet already, it will be cancelled. Otherwise, the route looks up its route caches to find a route to destination. If it's not found, it supplements its address into the packet, for rebroadcast. If a route is found in its route cache, then it will send a route reply packet, which is sent to the source by route cache or the route Discovery. The second is route maintenance. When the source route forwards the packet, the intermediate nodes responsible for transmission will be in charge to preserve the route, and will confirm that the packet has been received by the next hop along the source route.

4.4 Temporally Ordered Routing Algorithm (TORA)

TORA [13], the key merit of this protocol is the way of interaction with link failure by deleting the invalid routes in the network; it looks for a new route and builds it in a single pass of distributed algorithms. TORA routing algorithm has three main functions, they are: Route Creation, Route Maintenance and Route Erasure. The first function Route Creation uses the process of transforming an undirected network into a DAG (Directed Acyclic Graph) at a destination by specifying the directions to the link. And the second function Route Maintenance will be used to invert some of the link failures that happen due to which, some nodes lose all paths to destination. And finally the Route Erasure process deletes all routes in partitions that do not have the destination.

4.5 Light-weight Mobile Routing (LMR).

The LMR protocol [14] is used as an overflowing technique to decide its routes .The nodes will save multiple routes to each required destination. This will increase the accuracy of the protocol to give the nodes a chance to choose the next available route to a specific point, without initiating a route discovery procedure. In LMR each node will only preserve the information of routing to their neighbors. That will help avoid extra delays and storage overheads associated with maintaining complete routes. LMR may also provide temporal invalid routes, which define extra delays in deciding a right loop.

5. Description Of Hybrid Protocols

5.1 Hybrid Routing Protocols

Hybrid Protocols [15] are the integration of both previous routing protocols, proactive and reactive. The hybrid routing protocols are proposed to minimize the control overhead in table-driven (proactive) routing protocols as well as to diminish the latency in On-demand (reactive) routing protocols. The topology of network in hybrid routing protocol is zone or region based. The process of transmitting data within the region is simply pursuing proactive routing protocols, and if the procedure of data transmission happens between diverse zones or regions, it is fulfilled through reactive routing protocols. Some of Hybrid protocols are: Zone Routing Protocol (ZRP), Zone-based Hierarchical Link State (ZHLS), Scalable Location Update Routing Protocol (SLURP), and Distributed Spanning Trees based routing protocol (DST).

5.2 Zone Routing Protocol (ZRP)

ZRP [16] was deemed as the first Hybrid Routing algorithm with both table-driven (proactive) routing protocols and on-demand (reactive) routing protocols. The purpose of zone routing protocol is to minify the control overhead of table-driven (proactive) routing protocols, as well as to diminish the latency that is caused by the routing discovery in on-demand (reactive) routing protocols. ZRP is constructed of two sub-protocols; Intra-zone Routing Protocol (IARP) which is considered as a proactive routing protocol and it is utilized inside the routing zones. The second sub-protocol is Inter-zone Routing Protocol (IERP) and it is a reactive routing protocol. The IERP sub-protocol is used between routing zones.

5.3 Zone-based Hierarchical Link State (ZHLS)

ZHLS [17] is another proactive routing protocol. Each mobile node in ZHLS will presume that it knows its physical location with the help from the system location like GPS. The network in this protocol will be split into non-overlapping zones based on geographical information. ZHLS utilizes a hierarchical addressing scheme that consists of zone ID and node ID. A node selects its zone ID according to its location and the pre-defined zone map is well known to all nodes in the topology of a network. It is supposed that a virtual

link relates two zones if at least one physical link exists between the zones. A two-level network topology structure is defined in ZHLS, the node level topology and the zone level topology. Respectively, there are two kinds of link state updates; the node level LSP (Link State Packet) and the zone level LSP. A node level LSP contains the node IDs of its neighbors in the same zone and the zone IDs of all other zones.

5.4 Wireless Ad hoc Routing Protocol (WARP)

WARP [18] is a Hybrid Routing Protocol. This routing algorithm has the same concept like ZRP but the only difference is that it has a supplementary enhancement advantage than the ZRP routing protocol, and that feature is the Quality of Service (QOS). The routing discovery and route maintenance in WARP will be executed by using user datagram protocol (UDP). In WARP, the term Neighbor Discovery Protocol (NDP) is utilized to locate one hop neighbor. Another term used in WARP is Proactive Routing Protocol (PRP) and it is a timer based link state routing protocol. The WARP routing algorithm provides obvious source routing, which supply End to End the Quality of Service support.

5.5 Scalable Location Update Routing Protocol (SLURP)

SLURP is similar to ZLHS in concept of the nodes that are regulated into a number of non-overlapping zones. SLURP is another proactive routing protocol which has the ability to adapt with changes that occur in the node consistency and mobility. This routing algorithm utilizes the GPS information to administer the location of the node and remove global routing. Each node in the network will be correlating with a home zone and forward its new location to its home zone as it moves. Hence, the only host node has to query the home zone of the destination when the route is desired. The SLURP routing protocol is appropriate for massive networks where the mobility of nodes are elevated [19, 20].

6. Conclusion

MANET is considered as a new technology that has a great application in the new arena of Telecommunication, Internet Systems, and Internet mobility. The concept of routing protocols has a large impact on wireless topology of network and mobile Ad hoc networks. The appropriate selection according to the network will increase and support its credibility and scalability. This article studies different routing protocols for MANET, which are broadly categorized as proactive, reactive and Hybrid protocols. In proactive routing protocols the nodes will update the routing table constantly within a network that will let all the nodes throughout the topology of network to recognize each other, and will be easier to find any destination node. But this process of communication will increase the packet overhead which reduces the network performance. The reactive routing protocols create the route when the source needs to forward the packet data. The route discovery overflows within the network to find the optimal path, but the process of flooding in the network will be more overhead. Finally, hybrid routing protocols are commonly deemed as integration of both previous protocols (proactive and reactive), with a latency more than that of the proactive protocols [21].

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Review

A Comparative Study Of Various Task Scheduling Algorithms In Cloud Environment

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Abstract

Task scheduling approach is a strategy through which tasks are coordinated, or assigned to datacenter resources. Due to conflicting scheduling, it is difficult to offer an absolutely perfect scheduling algorithm. In cloud computing, data stored in distant cloud data centers to reduce the memory constraints, and the main focus of scheduling is to reduce the memory constraints and the computation time and cost. The data sent from the cloud center is needed to be scheduled on the appropriate virtual machine for maintaining the performance of the server. In this paper, various task scheduling algorithms in cloud environment are presented. This study concludes that most of the existing scheduling algorithms mainly focus on minimizing and reducing the cost, CPU utilization, completion time, reducing service response time and maximizing throughput.

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1. Introduction

A Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers, that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements that are established through negotiation between the service provider and consumers[1]. Cloud computing is considered as a benefit for the small businesses since it enables them to have admittance to innovations that weren't available before, as far as cash spending; and these is considered leverage for them since they can begin contending with other independent ventures or even with huge ones[2].

The cloud has three different deployment models. Each model has its own benefits and trade-offs. Private cloud: This cloud is setup specifically for an organization that has its own data center. The organizations manage all the cloud resources owned by them. The private cloud offers more security as compared to the other two models; the resources are shared internally. Public cloud: This cloud is available to all the external users through the internet who can register with cloud and can use the cloud resources on a pay-per-use model. This cloud is not secure like the private cloud because it is accessible to the internet users. Hybrid cloud: This is a type of private cloud, which uses the resources of one or more public clouds. It is a mix of both, private cloud and public cloud. Hybrid cloud thus aggregates the properties of every personal and public cloud like measurability, flexibility and security. Community Cloud: Community Cloud permits sharing its resources among the users of multiple organizations who have the same desires and objectives. As cloud computing services have grown in popularity, the amount of data and tasks to be dealt with have also sharply increased, requiring a lot of system resources and sometimes resulting in severe resource waste [3]. The cost suggested for somebody to come and settle/introduce an application will be chopped down and the organization will spare cash; it is less expensive to utilize applications that are on cloud than to purchase different ones. There is the likelihood to utilize one multi-application cloud benefit for every one of the necessities of the organization. The applications that exist on the cloud will incorporate consummately inside the organization in light of the API; that is finding the application that is good with the organizations objectives. Since cloud computing is overhauled consistently, the organization does not have to burn through cash for this. Cloud computing is a route for organizations to cut the costs of the organization [4].

2. Related Work

A cloud scheduler is a cloud-enable distributed resource manager. It manages virtual machines on clouds to create an environment for job execution. The first-in-first-out (FIFO) scheduler in Hadoop MapReduce, fair scheduler on Facebook, and capacity scheduler in Yahoo are typical examples that serve the cloud systems with efficient and equitable resource management, but none of these schedulers satisfies QoS (quality of service) constraints. Therefore, they are not applicable to soft real-time needed applications and services that are becoming more and more important and necessary in the hybrid cloud environment [5]. Task scheduling can approximately be categorized into two groups, dynamic scheduling and static scheduling. In the dynamic category, the execution, communication costs, and the relationship of the tasks are unknown. Decisions are made at runtime. While in the static category, such information is known ahead of time. Dynamic scheduling is runtime scheduling, whereas static scheduling is compile-time scheduling [6]. In cloud computing, the tasks are performed in the physical machine (PMs) or the VMs as per the task requirements. The data required for the execution of the tasks and services are stored at multiple distant storage locations called as the data centers which are also used with specific costs [7].

An evolutionary multi-objective optimization (EMO) algorithm [8] proposed to reduce the workflow scheduling problem such as cost and makespan. Due to the specific properties of the workflow scheduling problem, the existing genetic operations, such as binary encoding, real-valued encoding, and the corresponding variation operators are based on them in the EMO. The problem is that the approach does not consider

monetary costs and time overheads of both communication and storage. Zhang et al.
[9] proposed a fine-grained scheduling approach called phase and resource information-aware scheduler for MapReduce (PRISM) for scheduling in the MapReduce model. MapReduce has been utilized for its efficiency in reducing the running time of the data-intensive jobs but most of the MapReduce schedulers are designed on the basis of task-level solutions that provide suboptimal job performances. Moreover, the task-level schedulers face difficulties in reducing the job execution time. Hence, the PRISM was developed, which divides tasks into phases. Each phase with a constant resource usage profile performs scheduling at the phase level. Thus, the overall job execution time can be reduced significantly, but the problem of meeting job deadlines in the phase level scheduling is a serious concern that requires specified attention.

In [10] a cost-effective deadline constraint dynamic scheduling algorithm proposed for the scientific workflows. The workflow scheduling algorithms in the grid and clusters are efficient but could not be utilized effectively in the cloud environment because of the on demand resource provisioning and pay-as-you-go pricing model. Hence, scheduling using a dynamic cost-effective deadline-constrained heuristic algorithm has been utilized to exploit the features of cloud by considering the virtual machine performance variability and instance acquisition delay to determine the time scheduling. The problem with the approach is that VM failures may adversely affect the overall workflow execution time. Mohammed et al.
[5] presented adaptive cost-based task scheduling (ACTS) considering the data access completion time and the cost of data access to improve the scheduling performance, and fetching the data from the data centers effectively. The approach focuses on providing data access for executing each task with maintained costs, and provides better performance in terms of execution time, computation cost, communication cost, and bandwidth as well as CPU utilization. The task scheduling is performed for the already determined task demands, and it is quite challenging to schedule tasks with undetermined demands. An agent-based dynamic scheduling algorithm named ANGEL [11] proposed for effective scheduling of tasks in the virtualized clouds. In this approach, a bidirectional announcement-bidding mechanism and the collaborative process are performed to improve the scheduling performance. To further improve the scheduling, elasticity is considered to dynamically add VMs. The calculation rules are generated to improve the bidding process that in turn reduces the delay. The problem with this approach is that it reduces the performance as it does not consider the communication and dispatching times. Zhu et al. [12] presented real-time task oriented energy aware (EA) scheduling called EARH for the virtualized clouds. The proposed approach is based on rolling-horizon (RH) optimization and the procedures are developed for creation, migration, and cancellation of VMs to dynamically adjust the scale of cloud to achieve real time deadlines and reduce energy. The EARH approach has the drawback of the number of cycles assigned to the VMs that cannot be updated dynamically. Hyper-heuristic scheduling algorithm (HHSA) [13] provided effective cloud scheduling solutions. The diversity detection and improvement detection operators are utilized in this approach to dynamically determine the better low-level heuristic for the effective scheduling. HHSA can reduce the make span of task scheduling in addition to the overall scheduling performance. The drawback is that the approach has a high overhead of connection which reduces the importance of scheduling and thus reduces the overall performance. Zuo et al.
[14] presented self-adaptive learning particle swarm optimization- (SLPSO-) based scheduling approach for deadline constraint task scheduling in hybrid IaaS clouds. The approach solves the problem of meeting the peak demand for preserving the quality-of-service constraints by using the PSO optimization technique. The approach provides better scheduling of the tasks with maximizing the profit of IaaS provider while guaranteeing QoS. The problem with this approach is the lack of priority determination, which results in failure of deadline tasks. From the literature, it is found that the major issues in the above described methods have high cost consumption, especially for communication and computation

of data from cloud data centers. The inability to meet up the deadlines, due to the inappropriate data path allocation while task scheduling, is another area of concern. The analysis of various scheduling schemes is listed as below.

Analysis of Task Scheduling Schemes

Scheduling of the task is a major activity performed in all the computing environments. The main reason is that in cloud computing the resource provision is on-demand and the resources are provided on the basis of pay-per-use. Hence, the scheduling approach has to make use of the features of the cloud in order to efficiently schedule the tasks without time delay. While processing a task in a VM, the data are needed to be obtained from the distant data centers located at multiple locations. As the tasks are deadline constrained, the data are needed to be obtained within the particular time using effective scheduling approaches. However, the solution for scheduling deadline constraint tasks in the cloud leads to a new problem in the form of cost. The computation and the storage resources are the basic resources in the cloud environment that form the cost models. Table 1 shows the various scheduling schemes described in the literature and their advantages, drawbacks and simulations used.

Scheduling Scheme	Advantages	Drawbacks	Simulations
Phase and Resource Information-aware Scheduler for MapReduce (PRISM)	Reduced the overall job execution time	Deadlines are not specified	Hadoop 0.20.2.
Throughput-optimal Scheduling & Load-Balancing Algorithm	An exact MaxWeight schedule is chosen automatically at refresh times	Utilizing queue lengths in weights is based on assumption	Unknown
Hyper-heuristic Scheduling Algorithm	Reduce the make span of task scheduling and improves the scheduling performance	High overhead of connection	Hadoop
Adaptive Cost-Based Task Scheduling (ACTS)	-Provided data access for executing each task with maintained costs. -Fetched the data from the data centers effectively	-Improved the scheduling performance Doesn't schedule tasks with undetermined demands	CloudSim
Self-Adaptive Learning Particle Swarm Optimization (SLPSO)-based scheduling	Provided better scheduling of the tasks with maximizing the profit of IaaS provider while guaranteeing QoS	Lack of priority to deadline constraint tasks results in task failures	Matlab 7.0
Energy Aware Rolling-Horizon (EARH) Optimization Based Scheduling	Achieved real time deadlines and reduce the energy.	Lack of updating in number of VM cycles	CloudSim toolkit
Agent-Based Scheduling Algorithm In Virtualized Clouds (ANGEL)	Improved the bidding process that in turn reduces the delay	Non-consideration of communication and dispatching time reducing performance	CloudSim toolkit
Evolutionary Multi Objective(EMO) workflow scheduling	Reduced the workflow scheduling	Non-consideration of monetary costs and time overhead does not improve performance	Unknown

3. Conclusion

Scheduling is one of the most important issues in the management of applications in a cloud computing environment. Scheduling tasks in cloud computing with minimum delay and effective cost management is a challenging task. Hence, in this paper, we have analyzed various task scheduling algorithms in cloud environment. This study concludes that most of the existing scheduling algorithms mainly focus on minimizing the completion time, reducing the cost, reducing service response time and maximizing throughput. The ACTS algorithm is the most efficient because it avoids the most drawbacks on the various scheduling algorithms that are described in the literature.

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Saba Journal of Information Technology and Networking (SJITN)

Review

Empirical Study Of Virtual Machine Placement Algorithm

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Abstract

Virtual machine placement is one of the most important features in virtual machine technology. It plays a crucial role in resource utilization, load balancing, and in reducing energy consumption. This paper represents the survey of various types of virtual machine placement techniques and algorithms in cloud computing.

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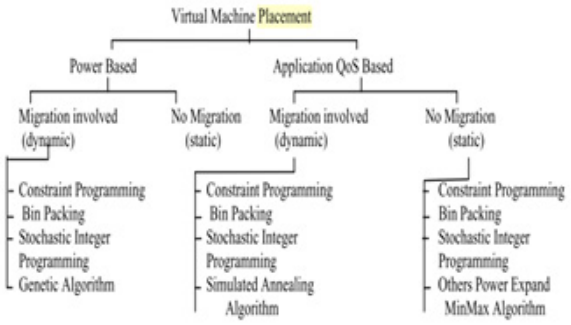
1. Introduction

Cloud computing is a technique of supplying technology means like servers, storage, databases, networking, software, and platform to the end user through Internet. It performs the main role in today's information technology. All services are provided via internet, and are established through a pay-as-you-use, and on-demand resources. It offers three levels of services: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Virtualization allows better performance of a server by creating many virtual machines in the cloud that store different and multiple operating systems on a single shared computer. It can be used over the network by operating web browser and fast network connection.[1] Virtual Machine is an operating system environment that is installed in a software, and which imitates dedicated hardware. Large computers or servers may run various VMs, providing different services. [2] Live virtual machine (VM) migration refers to the process of moving a running virtual machine or application between different physical machines without disconnecting the client or the application itself. It demands moving all the state information of the VM that are being migrated, with memory state, network state and storage state, from one physical server to another within the same data center or across remote data centers [3]. Physical machines (PMs) in data centers may have to periodically undergo maintenance processes; we may enable the migration of VMs to other active PMs, utilize the usage of resource or consume power usage. With the increasing size of storage requirements, the inefficient use of resources causes high energy consumption [4, 5]. The rest of this paper is organized as follows: section 2 discusses virtual machine placement algorithms, and section 3 presents the conclusions.

2.Virtual Machine Placement Algorithms

Virtual Machine (VM) placement is a very important process that is conducted as part of the VM migration and aims to find the best Physical Machine (PM) to host the VMs. Many VM placement algorithms are offered for VM placement in the cloud computing; that used to improve various factors affecting the virtual machine, host, and datacenter. There are two commonly used policies; static allocation and dynamic allocation. Static allocation manually assigns VM to servers. Resource allocation limits consolidation and increases the cost of running the services [6]. The dynamic allocation of VMs with live migration has received significant attention in comparison to the proposed algorithms that have been provided. The VMs are firstly assigned to servers according to a normal workload, then, the migration procedure is performed when servers are overloaded or underutilized. Static resource allocation is different from the dynamic resource allocation method; it does not need planning. In dynamic allocation the number of active servers is adjusted dynamically. There are many algorithms that have been offered to handle the VM placement problem. Based on a placement goal, Anjana Shankar [7] broadly classified VM Placement algorithms in her research as follows:



Unified ant colony system (UACS)[8] at the beginning, it has a plenty of servers to host the VM. Then, it reduces the number of host and minimizes VM migrations. It is compared to ACS algorithms.

Best-fit Decreasing Heuristic Algorithm [9] is proposed to use the fullest capacity of the first host before using the other one. It is compared to both the shortest job first allocation and the round-robin allocation.

Genetic Ant Colony Algorithm (GACA- VMP) [10] is efficiently minimizing the used resourc-

es, like the number of servers. It contrasts with the Ant Colony Algorithm that minimizes the resource wastage and power consumption. It is also compared to the Multi-Objective Evolutionary Algorithms.

Modified Best Fit Decreasing (MBFD) [12] is proposed to find the best place for VM; that minimizes the power consumption like VMPMBBO. It differs from Best Fit Decreasing (BFD).

Dynamic VM Consolidation Algorithm [13] is proposed to reduce both energy consumption and SLA violations.

Minimization of migrations Algorithm [12] is proposed to select the minimum number of VMs needed to migrate from a host to lower the CPU utilization below the upper utilization threshold; by selecting the VM with the highest utilization. Load Aware Virtual Machine Placement (LAVMP) Algorithm [14] is planned to load data centers in order to minimize network costs and energy consumption. It needs a fewer migration number of VM. It is compared to energy aware placement methods, which requires nearly the same energy.

Dynamic VM placement [15] achieved a high resource utilization rate (minimal number of host) and minimized power consumption. Improved Grouping Genetic Algorithm (IGGA) [16] used to decrease the number of VM migration and minimize the power consumption like UACS .It is compared with MBFD.

Multi-objective ant colony system algorithm (MOACS) [17] is planned to reduce the number of hosts, and try to minimize the number of the VM migration, in similarity to IGGA and UACS; which are compared to the Ant Colony Optimization and the Ant Colony System.

Load Level based Optimization for Virtual Machine Allocation (LLOOVIA) [18] is used to find the optimal location for the VM based on the service.

Multi-Objective Ant Colony System Algorithm [19] minimizes the resource wastage and power consumption. It is similar to Dynamic VM placement. It generally outperforms multi-objective genetic algorithm, two single-objective algorithms, a well-known bin- packing algorithm and a max–min ant system (MMAS) algorithm.

There are a lot of elements that are considered when we place a virtual machine on a host such as:

1) Decrease the migration process as much as possible; as it can save resource consumption such as network bandwidth.

2) There are rules to determine when to migrate VMs under some conditions; such as energy saving or heavy load on some host. And we need to make the urgent decision.

3) Decision must be taken to select which VMs are to be migrated.

4) Exploring a group of host to identify the place where possibly VM can be stored

5) Policies for determining when to turn off/on hosts to save power

Here is the summary table for the various algorithms that are used in virtual machine placement and their aim in a tabular form.

No.	Algorithm	Energy Consumption	Resource Utilization	Fewest VM Migrations
1	Unified Ant Colony System (UACS)		yes	yes
2	Best-Fit Decreasing Heuristic Algorithm		yes	
3	Genetic Ant Colony Algorithm (GACA-VMP)			
4	Multi-Objective Biogeography-Based Optimization VMPMBBO	yes	yes	
5	Modified Best Fit Decreasing (MBFD)	yes		
6	Dynamic VM Consolidation Algorithm	yes		
7	Minimization of Migrations Algorithm		yes	

8	Load Aware Virtual Machine Placement (LAVMP) algorithm	yes		yes
9	Dynamic VM placement	yes	yes	
10	Improved Grouping Genetic algorithm(IGGA)	yes		yes
11	Multi-Objective Ant colony System Algorithm(MOACS)	yes		yes
12	Load Level based Optimization for Virtual machine Allocation(LLOOVIA)			yes
13	Multi-Objective Ant Colony System Algorithm	yes	yes	

3. Conclusion

Virtual machine (VM) placement is the procedure of selecting the most suitable server in a datacenter that will hold newly created VMs, or will host a migrated VM. This paper presents the virtual machine placement algorithms; which are used to minimize the power consumption or the efficiency of resources' use. There is no clear indication, but we can say that the 'Best-Fit Decreasing Heuristic Algorithm' is the best; in case of using the resource more efficiently.

In the future, we are going to implement an algorithm that chooses VM for migration and a set of host selection heuristic algorithm for defining where to migrate virtual machine; based on constraints that will improve the overall performance of migration and using the resources efficiently.

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Article

The Usage of Academic Social Network Sites by Researchers in Developing Countries: Opportunities and Challenges

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Abstract

Academic social network sites have become vital channels to distribute and share researches. In addition, they allow the spread of ideas, experience, and knowledge among many researchers located around the world. Most of the researchers move in with their papers, profiles, and projects, to gain more communication with other researchers and become more well-known in the academic research world. Yemen is one of least developed countries, suffering from several problems which can be challenging for efficient use of the Internet and its tools and services. This paper attempts to investigate the opportunities and challenges when using academic social network sites by researchers in the universities in Yemen and abroad. The impact of age, gender, specialization, place of graduation and current living place on the usage of academic social network sites was also addressed in this paper. The results showed that academic social network sites are still not well-known among Yemeni researchers. More than 33% of respondents do not know about them, although some of them consider to using one of them in future. The opportunities of using academic social network sites are still limited. Most of the respondents focus on view the other profiles rather than sharing their researches.

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1. Introduction

Peer-reviewed conferences and journals have traditionally been the focus of researchers' efforts to make their research universal. However, as social media have become more known, the way academics distribute their research is changing [1], [2]. Academics are starting more and more to use social media, and are expected to have a professional online attendance. Citation counts will no longer be enough to estimate research impact, and the social importance of authors will become increasingly significant. Thus, researchers have considered social media as a new and vital way to be more visible and to have their research discovered by peers [3], [1], [2]. The academic social networking sites (ASNSs) are websites that seek to shift the social web for academics, such as Academia.edu, ResearchGate, Mendeley, and Zotero, give each member a profile and allow him/her to connect to each other in some way and to share his/her publications [4]. Although reference sharing sites focus on readers; helping users to share and find relevant references for their work [5], Academia.edu and ResearchGate focus more on the publishing of research and projects [4]. These sites are preferred to bring scholars from different disciplines together in an academic community.

Academia.edu was founded in September 2008 by a philosopher Richard Price [4], [6] at Oxford University, as an academic social network site. Academia.edu connects the users with non-academic ASNSs such as Facebook and Twitter [7]. ResearchGate was founded in 2008 by the physicians Dr. Ijad Madisch (Boston) and Dr. Soren Hofmayer (Berlin), and the computer scientist Horst Fickenscher (Berlin) [6]. ResearchGate focuses more on the producers of research [4]. It provides a score for evaluating researchers depending upon publication downloads, citation counts, participation in the discussion board and a number of views as well as the question and answer platform, in addition to the service of job searching services [7]. Mendeley was founded in 2009 by three German Ph.D. students (Victor Henning, Jan Reichelt and Paul Fockler) [6]. It facilitates uploading document libraries and allows importing and exporting citations to other similar tools such as EndNote and Zotero [7], [8].

2. Literature Review

Thelwall and Kousha [4] focus on Academia.edu in their research, providing some basic descriptive information about this site and methods for investigating it. The investigation focuses on members of philosophy departments because a philosopher started the site. Philosophers seem to be mainly extensive users, and the discipline of philosophy may display the most developed academia.edu use. This research investigates attributes of philosophy scholars on Academia.edu, introducing a median-based time-normalizing method to adjust for time delays in joining the site. The main objective of this research is to investigate whether Academia.edu is essentially used as a general social networking site, in which case younger users (e.g., students rather than faculty) and female users should be over-represented and more active [4].

El-Berry [7] in his research, attempts to explore the awareness and use of five famous ASNSs; namely ResearchGate, Acedemia.edu, LinkedIn, Mendeley and Scholastica by the South Valley University (SVU) academic staff. This paper was carried out by using a web-based online questionnaire created through Google Form. Over the limited period, a link to the questionnaire was sent via personal email and Facebook messages to academic staff at the SVU from different age ranges, designations, gender, and faculties. The questionnaire consisted of four clusters of questions. The first cluster was about the demographic characteristics. Data analysis of this cluster shows that the majority of respondents were from the younger researchers. Men responses were more than women, most of the respondents were from the faculties of applied sciences such as Medicine, Nursing, Veterinary Medicine, and Science, in addition to Agriculture and Engineering fields. The second cluster focused on the awareness and use of the ASNSs, this cluster began with a question; if respondents heard of one or more of the ASNSs. The most of the respondents reported that they had heard of these sites. The third cluster was about the benefits and obstacles of using the ASNSs. Finally, the fourth cluster reflected the way to improve the awareness and use of the academic staff at the SVU to the ASNSs [7].

Espinoza and others [1] conducted an exploratory inductive comparative study of the services and tools of a select set of ASNSs. They argued that maintaining multiple profiles might be time-consuming. They suggested starting a discussion about how they can make this process less cumbersome. They aimed for their study and findings to help academics and researchers make informed decisions about their choice of ASNSs. Through the ASNSs the authors provide most of the services they evaluated (collaboration, online persona management, research dissemination, documents management, and impact measurement service); they tended to specialize in one or two. Espinoza indicated that all sites provide communication tools, whereas Mendeley provides the most collaboration tools. Assumed that researchers usually have several profiles, it can become cumbersome and time-consuming to manage all of them, that why they recommended researchers to strategically select the ASNSs that meet his/her goals. The authors concluded that future research could explore ways to facilitate managing multiple profiles across ASNSs and the actual impact their services have on employment, dissemination of results, and collaboration [1].

Relojo and Pilao [9] provided a general overview of the current trends within the academic networking service, and in the end, its impacts on the digital academic. Their paper specifically focused on popular academic networking services such as Academi.edu, Mendeley, and ResearchGate. In addition, Twitter had been taken into account in their study. Their discussion focuses on the benefits, key contributions and future directions of these platforms to both experienced and early career researchers (ECRs). The authors inducted that these ASNSs are still in their early stages to totally scale their impact on how these have facilitated collaborative partnerships among researchers, particularly to those seeking interdisciplinary collaborations. In addition, they expected that these academic sites are like any other websites, could possibly encounter financial issues in the future, which may result in discontinuation of their services. However, in the meantime, the research community cannot deny the fact that these services are becoming increasingly popular in scholarly communication [9].

2.1. Definition of ASNSs

Social network is a social structure of nodes that represents individuals and organizations, to present the relationships between them within a certain domain [10]. Online Social networks have gained a tremendous popularity among people all around the world, especially in the colleges [11]. Academic social networks are forms of internet services, which facilitate the management of relations among scientists, sharing the resource for publications [6]. Academic social network sites like Academia.edu, Mendeley and ResearchGate and others, provide similar features and benefits to their users [El-Berry]. These sites give scholars the ability to publish their research outputs and connect to each other [4].

ResearchGate is a social networking site for scientists and researchers to share papers, ask and answer questions, and find collaborators. According to a study by Nature and an article in Times Higher Education, it is the largest academic social network in terms of active users [12], [13]. Academia.edu is a venture-capital funded private company that provides a social networking website for academics. The platform can be used to share papers, monitor deep analytics around the impact of their research, and track the research of academics they follow, in a particular field [14], [15]. Mendeley is a desktop and web program produced by Elsevier for managing and sharing research papers, discovering research data and collaborating online [16], [9], [3].

2.2. Opportunities of Academic Social Networks Sites

All academic social network sites provide the ability to upload researchers' publications, make their networks visible to other users, and allow linking to non-academic social media like Twitter or Facebook. In addition, all of the academic social network sites allow uploading publication files [7]. They give each member a profile and allow these members to connect with each other in some way as well as to share information about their publications [4], in addition to enabling them to manage and share bibliography [17]. Other benefits like evaluation or discussion of documents, exchange with the intermediary groups/communities or with people sharing the

same interest topics, and skills expertise [17].

While all sites calculate profile or document views, ResearchGate provides academically focused metrics [1]. Academic social network sites allow a certain responsiveness and informality that is not possible with the formal publishing. Another advantage of academic social networks is that they allow work to be shared, with both ResearchGate and Academia.edu giving members the ability to upload their own papers. ResearchGate has its own measurement, called RG Score, which assigns members each with a score based upon content interactions and the score of the members interacting with the content. Content greatly contributes to ResearchGate, like profile information and answered or asked questions, influences the RG score, in addition to publication information, like views, downloads, and citations [2]. ResearchGate's question-and-answer part is an important and interesting feature. Given a large number of members, it can present a way to crowd-source problems [18].

2.3. Challenges of Academic Social Network Sites

There are some challenges that have been recorded by Aventurier [17]. He listed some questions which are faced the researchers.

Which the platform can be used? How difficult is it to chose and no interoperability? Is it time-consuming? Does share it will leave to a competitor?. what are the advantage and the sustainability? Are there enough active users? What is the optimized or the inefficient use? Is there a lack of management of digital identity?

On the other hand, Aventurier listed as well some challenges for institutions. Asking about the spread of knowledge that might be used by competitors, lack of control of the institution reputation, analyze by other institutions of the use of networks, tools multiplication

3.Research Methodology

This study was carried out by using a web-based online questionnaire created through Google Forms. The authors preferred to use the questionnaire because it is the most suitable quantitative method for obtaining data from a representative sample of people. The respondents are all Yemeni researchers who are working at universities in Yemen and abroad. The sample covered all Yemeni universities (public and private). The sample also includes different age groups, gender, education levels, the place of study or graduation, current location; place of living and finally all university specializations.

The questionnaire was designed to collect information for four main factors. The first one was about the demographic characteristic, the second one was about the knowledge of these networks, third one was about the benefits and opportunities of these academic social network sites and the last factor was about the problems and challenges in using academic social networks sites. The questions under each factor were obtained from the literature review as well as the authors' own experiences. The questionnaire was distributed to three groups of Yemeni researchers on Facebook and to all relevant researchers elsewhere.

3.1. Research Questions

The present research aims to find answers to the following questions

1.How many Yemeni researchers use ASNSs?

2.How do they benefit from ASNSs?

3.What are the challenges and problems they face with ASNSs?

4.Do gender and age affect the way Yemeni researchers use ASNSs?

5.Do the level of education/and field of study affect the way the Yemeni academics deal with ASNSs?

6.Does the place 'where they studied/live' affect the way Yemeni researchers deal with ASNSs?

3.2. Research Goals

The research aims to determine the following factors:

1.The opportunities and benefits of ASNSs according to Yemeni researchers' point of view.

2.The challenges and problems Yemeni researchers may face using ASNSs.

3.The impact of gender and age on using ASNSs.

4.The impact of level/field of study on using ASNSs.

5.The impact of place of study/living on using ASNSs.

4.Research Importance

Academic social network sites are still new especially in the context of Yemeni researchers. From

this point, our research contributes to the knowledge of investigating and studying this new area of interest. Our research spots the light on these vital sites for the researchers to see how they Can benefit from joining academic social network sites and what are the challenges they are facing. Moreover, our research might encourage them to coop with the technology to make their researches visible and global.

5. Analyzing Findings

Yemen is one of least developed countries. It suffers from many problems that are not our subject in this paper, only those related to the internet and economic problems, which might affect the usage of academic social network sites. Our sample includes Yemeni researchers who are working in universities either in Yemen or outside Yemen.

5.1. Data Analysis

Table 1 presents the research sample with its characteristics and the impact of these characteristics on the usage of academic social network sites. It presents two parts. First, it summarizes the basic information of the respondents' characteristics. Second, it gives the impact view of the demographic characteristics on the academic social network sites usage.

Table no.1: Demographic Characteristics and the Usage of ASNSs

Demographic Characteristics of Respondents				The Impact of Demographic Characteristics on the Usage of ASNSs	
Demographic Characteristics		No	Percentage	Using ASNSs	Not Using ASNSs
Age	25 – 34	18	24%	14 (78%)	4 (think about using) 0 (do not think about using)
	35 – 44	34	45.3%	22 (65%)	10 (think about using) 2 (do not think about using)
	45 – 54	14	18.7%	10 (71%)	4 (think about using) 0 (do not think about using)
	Over 55	9	12%	5 (56%)	4 (think about using) 0 (do not think about using)
	Total	75			
Gender	Male	43	57.3%	32 (74%)	10 (think about using) 1 (do not think about using)
	Female	32	42.7%	18 (56%)	15 (think about using) 0 (do not think about using)
	Total	75			
Education Level	Postdoc	16	21.3%	12(75%)	4 (think about using) 0 (do not think about using)
	PhD	36	48%	21 (58%)	14(think about using) 1 (not think about using)
	MSc	23	30.7%	16 (70%)	6 (think about using) 1 (do not think about using)
	Total	75			

University of last/Current study	Yemen	17	22.7%	9 (53%)	8 (think about using) 0 (do not think about using)
	Arab	31	41.3%	23 (74%)	7 (think about using) 1 (do not think about using)
	International	27	36%	17 (63%)	9 (think about using) 0 (do not think about using)
	Total	75			
Current Location	Yemen	42	56%	20 (48%)	22 (think about using) 0 (do not think about using)
	Abroad	33	44%	29 (88%)	2 (think about using) 2 (do not think about using)
	Total	75			
Specialty	Applied Sciences (IT, Engineering , Health …)	50	66.7%	34 (68%)	14 (think about using) 2 (do not think about using)
	Social Sciences and Humanities	25	33.3%	15 (60%)	10 (think about using) 0 (do not think about using)
	Total	75			
Total of respondents =(75)					

5.2. Demographic Characteristics of Respondents' Analysis

Table.1 shows that there were 75 respondents who participated in this study. The results shown in Table 1 indicate that 45.3% of the respondents were at the age range between 35 and 44.

The male respondents were 43 (57.3%) whereas female respondents were 32 (42.7%). According to the level of the respondents', 48% each had a Ph.D. degree. About 41.3% have graduated from Arab universities. (56%) of the respondents were in Yemen at the time this research was done. Finally, 66.7% of the respondents' came from the field of applied sciences.

5.3. The Impact of Demographic Characteristics on the Usage of ASNSs

(The Usage and Intent to Use Analysis)

In this part of data analysis, we are going to investigate the impact of the demographic characteristics of both elements; the usage of academic social network sites and the intent to use 'the readiness'. Data has been obtained from the Etcel file that was derived from the Google form models. Then we used sorting and filtering features that are based on required data to record how many respondents there are who are using personal cloud storages and how many are intending to use them according to each of the demographics characteristics in our study.

From table 1, there were 18 respondents who responded to this questionnaire who lie in the age range of 25 to 35 years old, 14 of them reported that they were using academic social network sites. This means 78% from respondents in this age range are using academic social network sites. On the other hand, only 56% of the respondents who age over 55 years old are using academic social network sites. This result showed that age does affect the usage of academic social network sites. The younger researchers use academic social network sites more than the older ones. All age ranges showed good results in intending to use the sites, as shown in the table.

There were 43 males who responded to this questionnaire, 32 of them were using academic social networking sites. This means that 74% of the males in this study are using academic social networking sites. On the other hand, only 55% of the females (only 18 out of 32) are using academic social networking sites. These who do not use academic social networking sites are considering

using them as shown in the table. This result is expected due to the fact that males in Yemen have a wider chance to develop themselves further and use technology more than females due to the country's culture.

The level of education showed that 12 respondents out of the16 who have postdoc are using academic social networking sites, that means (75%) of them are using academic social networking sites. 16 out of 23 respondents with MSc level of education are using academic social networking sites. That means 70% of the respondents are using academic social networks sites.

On the other hand, 58% of the PhD respondents are using academic social networking sites.

Furthermore, all respondents from all levels of education in this study showed positive attitudes towards the use of academic social networking sites. From the above table, 31 out of 32 of respondents who are still studying or have graduated from Arab Universities are using academic social networks sites (74%). On the other hand, 9 out of 17 (53%) of the respondents who are still studying or have graduated from Yemeni Universities are using academic social networks sites. This is an expected result, due to the culture of Yemen, where academic research is not supported in universities; that do not encourage their researchers to make use of the new technology, to further develop themselves. Almost all of the respondents who reported that they are not using academic social network sites are considering using them. The results showed that 20 out of 42 respondents who abroad are using academic social networks sites, whereas 29 of 33 respondents who live in Yemen are using academic social networks sites.

This result was expected, living abroad offers the chance to use internet and technology easily in comparison with those who live in Yemen. At the same time, the respondents who live in Yemen showed the intension to use them. This was an expected result. Yemeni people show a good inclination towards technology [19].

All the respondents from applied sciences showed good results in both using academic social network sites and in exhibiting the intension to use them. There are 34 of 50 who are using academic social network sites. In addition, 15 out of 25 who come from social science and humanities are using academic social network sites (68%). Moreover, respondents from social sciences and humanities studies showed a good result; the intension to use them. The expected result was that respondents from applied sciences would show a high percentage in using academic social network sites due to their good background regarding technology. In conclusion, we reach the fact that the usage of academic social network sites is still low among the Yemeni researchers. There are some respondents who reported that they have not heard about them at all! The good result is that most of the respondents indicated that they are considering using one of them. From our point of view, Yemeni researchers do not have the motivation to use academic social network sites because of the internet access problems in Yemen, as well as the lack of understanding of the importance of academic social network sites. It was expected that respondents from the applied sciences field would show a high percentage in using academic social network sites as well as the Yemenis living abroad. Again, the lack of motivation is another factor that hinders the development of their career and the manner of dealing with technology.

5.4. Discussion

Which academic network sites do respondents use more?

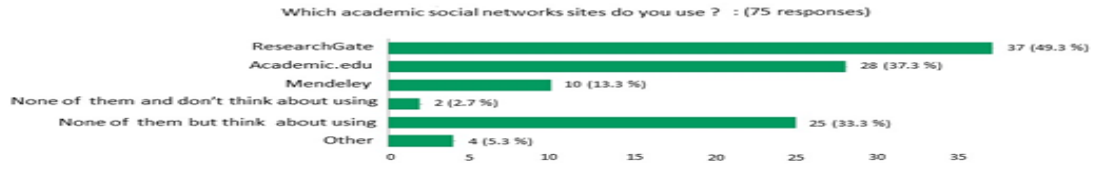

Fig.1. Which Academic Networks Sites do the Respondents Use more?

Figure 1. displayed that 49.3% of the respondents selected ResearchGate as the most common academic social network sites. Those of them who do not use any kind of academic social networks sites, (33%) are considering using it in the future. This presents a good indicator for future.

The Reasons Behind not using any Academic Sites:

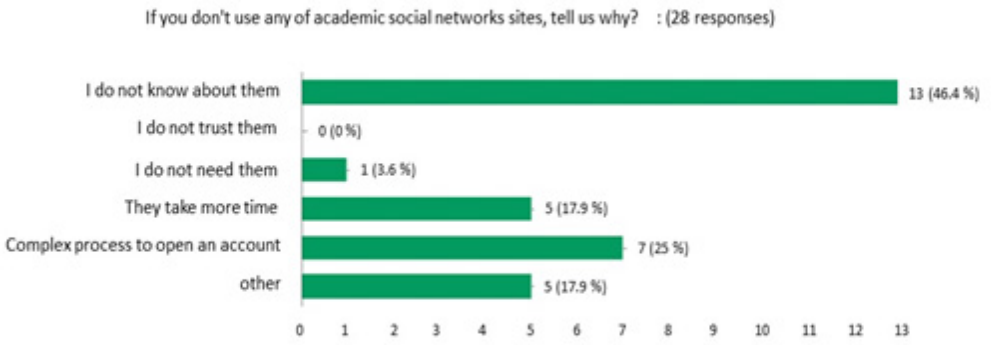

Fig. 2. The Reasons behind not Using any Academic Sites

Fig. 2. uncovered the main reasons behind why some respondent do not use any of the academic social network sites. 28 respondents have replied to this question. This means that (37%) of the given sample do not use academic social network sites. 13 of 28 respondents (46.4%) who are not using them, reported that they do not even know about them. 25% of them attain that academic network sites require a complex process to create an account. From our point of view, this could be possible due to the difficulty of English language to many respondents, especially those whose studies and specialties are in Arabic.

The Benefits of Using Academic Social Network Sites:

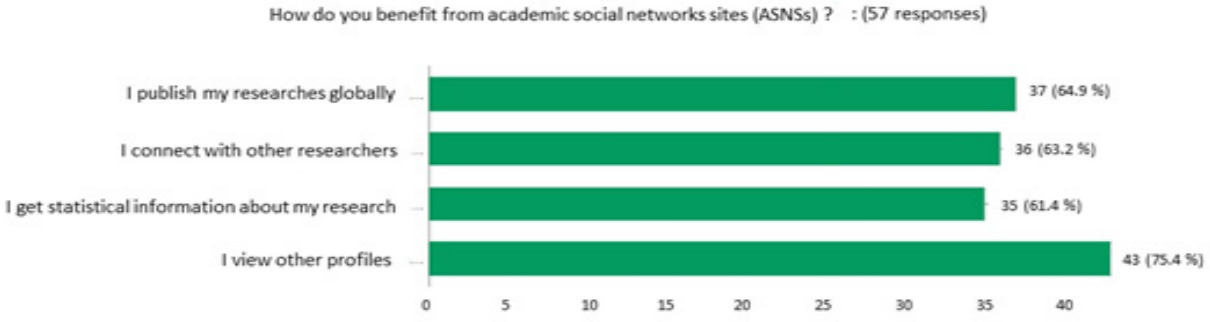

Fig.3. The Benefits of Using Academic Social Network Sites

To determine the benefits and opportunities of academic social network sites, we can analyze the above figure. The above figure shows that (75.4%) of Yemeni researchers, those who responded to the current study, benefit from academic social network sites through viewing the others profiles. There are other benefits like globally publishing researches, connecting with other researchers, getting statistical information about their researches. All showed low percentage on benefit of them, all of them arrange around 60%. Although publishing and sharing research is the main opportunity you get operating these academic sites, not all Yemeni researchers are shar-

ing their researches on the academic social network sites. From our point of view, that might be for two reasons. First, maybe some of them still have no published papers in journals or conferences. And the second reason is that they are not confident enough to share their researchers globally.

The Problems Facing Respondents when Using Academic Social Sites

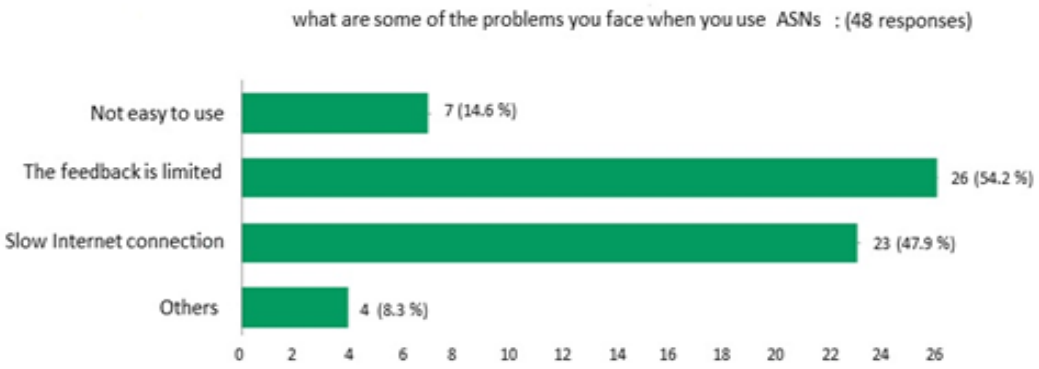

Fig. 4. The Problems Facing Respondents when Using Academic Social Sites

Figure 4. showed some of the problems and challenges that face Yemeni researchers. The limitation of feedback was the biggest problem facing researchers who responded to this research (54.2%). In addition, the problem of internet connection and its weakness in Yemen affects the usage of academic social network sites. Not easy to use was not a big problem, only (14.6%) of the respondents face this problem.

The Frequency of Access and Benefits of Academic Social Sites Analysis:

What researches do you share on (ASNSs)?	My published researches	All my researches (published and unpublished)		
	72.7%	27.3%		
How often do you access (ASNSs)?	Not often	Monthly	Daily	When I have a new research to share
	27.8%	11. 1%	29.6%	31.5%

Table 2. The Frequency of Access and Benefits of Academic Social Sites Analysis

Table 2. shows that the majority of the respondents (72.7%) share only their papers that have already been published in journals or conferences. In addition, (31.5%) of the respondents only access the academic social network sites when they have new researches to share.

6.Conclusions

The primary aim of our research is to find the opportunities and benefits of academic social network sites according to Yemeni researchers' point of view as well as the challenges and problems they might be facing. The second aim is to find the impact of gender and age, level/field of study, studying/living place on using academic social network sites. From all the questionnaire analysis and findings, we can conclude that academic social network sites are still not well recognized among Yemeni researchers. More than 33% of

respondents do not know about them, in spite some of them are considering using them in the future. The benefit of using academic social networks sites is to focus on and/or view the other researchers' profiles. Some of the opportunities that academic social network sites provide like joining projects, asking or answering questions, are still not used by the Yemeni researchers and maybe not of their interest, i.e. using Academic social network sites is still not one of the Yemeni researchers' essential issues in their academic career.

7. Recommendations

The authors arrive at a set of recommendations that can make a change on using academic social network sites and increase their utilization.

1.The Yemeni researchers who are already using academic social network sites should encourage their colleagues and invite them to make use of one of these academic sites, and to benefit more from them to improve their researches and join the global research world.

2.The Responsibility should be on the educational institutions as well. They should urge their academic staff to join these academic social network sites to help publish their researches and make them globally recognized. The aim of these developments is to assemble all the ideas and achievements together from all around the world and work together for quality and valuable research to assist the society and develop its quality life.

3.In Addition, our research and future research in this area of interest might shed the light on the current subject. It focuses on the importance for the Yemeni researchers to make use of the technology to benefit from these developments.

8.Acknowledgment

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