

Important Instructions:

- 1) Open this MS-Word document and start writing answers below each respective question given on page 2.**
- 2) Answers the question in the same sequence in which they appear.**
- 3) Provide to the point and concrete answers.**
- 4) First read the questions and understand what is required of you before writing the answer.**
- 5) Attempt the paper yourself and do not copy from your friends or the Internet. Students with exactly similar answers or copy paste from the Internet will not get any marks for their assignment.**
- 6) You can contact me for help if you have any doubt in the above instructions or the assignment questions.**
- 7) All questions must be attempted.**
- 8) Do not forget to write your name, university ID, class and section information.**
- 9) Rename you answer file with your university ID# before uploading to SIC.**
- 10) When you are finished with writing your answers and are ready to submit your answer, convert it to PDF (no MS Word) and upload it to SIC unzipped, before the deadline mentioned on SIC.**
- 11) Do not make any changes to the format provided.**
- 12) Failure in following the above instructions might result in deduction of marks.**

Final Exam, Course: - Mobile Computing

Deadline: - Mentioned on SIC

Marks: - 50

Program: - BS (CS), BS-SE

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Class and Section: BS(SE) A

Q1: Provide the names of 4 challenges that exist in Adhoc Networks.

(4)

Ans:

Four Challenges that exist Adhoc Network:

Infrastructure-less design adds difficulty in fault detection and management

Dynamic topology results in route changes and packet loss

Scalability is still unsolved, challenges include addressing, routing, configuration management, interoperability, etc.

Varied link/node capabilities cause variable processing capabilities

Energy constraints limit processing power; ad-hoc networks rely on each node being a “router”

Q2: How the nodes in the Adhoc Network know about the changing network topology. (2)

Ans:

Every node maintains **routing table** containing information about network topology. Routing tables are updated periodically whenever the network topology changes

These protocols maintain different numbers of routing tables varying from protocol to protocol

Advantages

Route immediately available Minimize **flooding**

Q3: Why is it important to minimize flooding of control packets in Adhoc Networks and how MPR achieves it? (4)

Ans: Flooding forms an integral part of routing protocols, network management, service discovery and information collection (sensing). Given the broadcast nature of ad hoc network communications, information dissemination provides a challenging problem. Blind flooding in ad hoc networks results in the broadcast storm problem. To limit the broadcast storm problem, mechanisms for optimized flooding have been proposed. However, this optimisation reduces the inherent level of redundancy. The minimum spanning tree (MST) algorithm using local one hop topology in a distributed manner as the basis of a more reliable optimised flooding mechanism called, reliable minimum spanning tree (RMST) flood is proposed. RMST utilises unique properties of MST graphs that allow for broadcast transmissions to be replaced by unicast transmissions. Unicast transmission is inherently more reliable than broadcast transmission as it utilises link layer acknowledgement and retransmission, thereby improving the reliability of a flood and reducing the broadcast storm problem. Simulation is used to show that RMST is able to achieve equivalent reliability in terms of packet delivery compared to blind flooding. Importantly, RMST is able to achieve significantly better performance than MPR and equivalent performance to LMSTFlood in terms of reducing the broadcast storm problem.

Q4: Explain briefly how Mobile Cloud Computing is different than simple mobile computing and simple cloud computing? (4)

Ans **Mobile Cloud Computing:**

Mobile Cloud Computing or MCC is a combination of cloud computing, mobile computing, and wireless network, in order to bring rich computational resources to mobile users, network operators, as well as cloud computing providers. The underlying idea here is to make it possible for the rich mobile applications to be executed on a huge number of mobile devices.

However, in all this terminology it is important to understand how one differs from the other, and for that purpose we look into the key ways in which cloud technology differs from the others

Cloud computing:

relates to the specific design of new technologies and services that allow data to be sent over distributed networks, through wireless connections, to a remote secure location that is usually maintained by a vendor. Cloud service providers usually serve multiple clients. They arrange access between the client's local or closed networks, and their own data storage and data backup systems.

Cloud computing Different then Mobile computing:

Cloud Computing affords a bridge between the client's local or closed networks and their private data storage & backup systems

mobile computing is more or less a consumer-facing service. Cloud computing on the other hand is something that is the preferred solution for a great number and variety of businesses & companies.

Q5: Explain the term MBaaS in your own words?

(4)

Ans: MBaaS:

Mobile backend as a service (MBaaS) is a cloud computing architecture that provides mobile applications with access to the servers, storage, databases and other resources they need to run.

An alternative to mobile middleware, a backend as a service (BaaS) approach uses unified application programming interfaces (APIs) and software developer's kits (SDKs) to connect mobile apps to backend resources in the cloud. MBaaS can also be used to federate backend services and provide common backend features such as push notifications, social networking integration and location services. This is a departure from typical mobile application development, which requires developers to incorporate the APIs of each backend service individually.

MBaaS empowers mobile developers by completely abstracting the server-side infrastructure. Developers can assemble the required building blocks and just write the code that connects them. This lets developers focus on delivering rich user experiences instead of dealing with mundane backend infrastructure.

Q6: Imagine you visit a completely new city. What kind of services a modern LBS can provide you at your location automatically?

(6)

Ans: Smart cities leverage technology and utilise existing and planned infrastructure investments to provide a higher quality of living to residents, a conducive investment climate for businesses and allow maximisation of resource utilisation and transparency for governments. They can be considered for organic integration of systems, IT infrastructure, physical infrastructure, social and business infrastructure. These systems work collectively so as to generate intelligent and actionable information for decision-makers.

Q7: Use your imagination as to how the following context can be used by a context aware application in mobile computing environment?

(8)

Date/Time

Environment

Emotional state

Focus of attention

Orientation

User preferences

Calendar (events)

Browsing history

Ans

Date/Time: its show for week and days.

Environment:

Emotional state

Focus of attention

Orientation

User preferences

Calendar (events)

Browsing history

Q8: Explain why energy efficiency is important in technologies like Bluetooth and ZigBEE?

(4)

Ans:

Energy efficiency is understood to mean the utilization of energy in the most cost effective manner to carry out a manufacturing process or provide a service, whereby energy waste is minimized and the overall consumption of primary energy resources is reduced. In other words, energy efficient practices or systems will seek to use less energy while conducting any energy-dependent activity: at the same time, the corresponding (negative) environmental impacts of energy consumption are minimize.

While increased energy use clearly has many benefits, we are also becoming increasingly aware of the negative impacts of energy use. We experience these negative impacts globally and locally in the form of climate change (and the associated effects) and degradation of local environments in terms of—for example— poor air quality, degradation of soils (leading to desertification in extreme cases), resource depletion (e.g. water) and noise pollution.

Q9: Explain briefly how you use RFID technology at INU on a daily basis when present on the campus? Do you use an active or passive tag? (4)

Ans:

Monitoring students of IQRA NATION UNIVERSITY (INU) movement around the campus is difficult especially for lecturer hall and laboratory access control. By using RFID technology, it is easy to track the student thus enhances the security and safety in selected zone. The application of active RFID in a student monitoring system is to improve faculty and INU management system to monitor particular group of students' whereabouts. This paper describes about an ongoing research which is currently in the stage of data collection to measure its' implementation in terms of effectiveness. The focus of the paper is to discuss about the development of the system which is called Student Monitoring System Using Active RFID

Q10: Explain how Wearable Computing can be employed in computer gaming? (5)

Ans: **Wearable Computing:**

Wearable computing is the study or practice of inventing, designing, building, or using miniature body-borne computational and sensory devices.

Wearable Computer, a sub branch of Mobile computing devices, means the computing device which we can wear on our body. Now a day's cell phones are the most powerful and day to day need of any human being. If we think about the past, we were doing our computing work manually. After the invention of basic calculator and further computers our most of work that we

are doing will be with the help of computers. In its ancient age of computers the size of computers was too much big such that it occupies a space of approx two rooms. After invention of Integrated Circuits its size becomes much small. In the middle era of computers we were using desktop computers which can be fitted on a small desk. At present we are using Laptops and Smartphone, which helps us to do our computing task anywhere. We can take these computing devices with us everywhere. In other words we can say that we can carry our office with us. The new era that we are seeing in past few years or that we will see in next few years is the era of Wearable Computers. Spy camera, Spy voice and video recording device, watch with computer, Spectacles with computing capabilities are few examples of this kind of devices

Q11: What kind of facilities and technologies must be present in order to call you own home a Smart Home? (5)

Ans:

Smart Homes:

Technology has been growing at insane speed, and it isn't slowing down. Things we once only saw in science fiction are now a reality. You can call people from your watch like James Bond, talk to your computer like Hal 9000 (though hopefully not just like Hal) and now you can have a smart home like Iron Man.

Smart home technology has actually been around for a few years. Bill Gates started building his smart home in 1988 and finished in 2005. Today, you don't have to be a billionaire to own a smart home, and it certainly won't take 17 years to construct. Whether you want to run your home through a central system, or are happy with app-based devices your options are very broad, and just keep widening.