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Re-Mid Semester Assignment
Course: - Distributed Computing

Deadline: - Mentioned on SIC **Marks: - 30**

Program: - MS (CS) **Dated: 13 June 2020**

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Class and Section:_____

Question1: **Discuss how the MMOG's as a Distributed System solves certain challenges due to its distributed architecture. (6)**

ANSWER1: Massively Multiplayer Online Games (MMOGs) are becoming a very important part of computer entertainment business. With the recent development of broadband technologies, the increase in the number of players is putting a strong pressure on this type of application. Commonly used clients/server systems don't cope well with scalability, limiting the number of players who can interact with each other, are not robust enough, and might be subject to bottlenecks due to their centralized infrastructure. These systems also force developers to invest enormous amounts of money in hardware and time to design complex software systems. To solve these problems we propose a fully distributed, peer-to-peer architecture for MMOGs.We discuss the issues surrounding MMOGs, the limitations in terms of network infrastructure and the lack of a simulation environment to study and evaluate network architectures and protocols. We use a peer-to-peer (P2P) based architecture and protocol to provide a more scalable, flexible, and robust technology solution than do currently used infrastructures. We conducted the design and implementation of a modular MMOG, called "Time-Prisoners," using a P2P protocol developed in Java and JXTA. The characteristics of P2P overlays enabled us to organize dynamically, and in transparent way for the users, the group of players according to their locations in the virtual world, and allowed the design of a scalable mechanism to distribute the game state to the players and to maintain a consistent world in case of node failures.

Question2: **Among the trends of Distributed Systems discussed in C1-Lec2, which trend in your opinion will be most dominant in the future and why? (6)**

ANSWER2: 1.Trends in distributed systems • Pervasive technology – Modern Internet – Collection of internetworked devices- wired & wireless – Pervasive resources and devices can be connected at any time and in any place

2. Trends in distributed systems intranet ISP desktop computer: backbone satellite link server: network link: A typical portion of the Internet

3. Trends in distributed systems • Mobile & ubiquitous computing – Small and portable devices are possible to be used within distributed systems • E.g. laptop computers, handheld devices, wearable devices, devices embedded in appliances – Mobile computing: portability of the devices and the ability to connect to networks in different places – Ubiquitous computing: small computing devices that available everywhere and are easily attached to networks

4. Trends in distributed systems Portable & handheld devices in a distributed system

5. Trends in distributed systems • Distributed multimedia systems – The use of multimedia contents in distributed systems • Multimedia support – Major benefits of multimedia support • Distributed multimedia computing can be accessed through desktop or mobile devices. E.g. live tv broadcast, video-on-demand, IP telephony, webcasting, etc.

6. Trends in distributed systems • Distributed computing as a utility – distributed resources as commodity or utility in similar as water and power. – Physical and logical service resources are rented rather than owned by the end users. • Physical resources: e.g. : storage and processing • Logical services: e.g. email, calendars – Cloud computing: distributed computing utility. A cloud is a set of internet-based application, storage and computing services sufficient to support most users' needs

7. Trends in distributed systems Cloud computing

8. Trends in distributed systems • Cloud are implemented on cluster computers to provide the appropriate scale and performance required by such services – A cluster computer: a set of interconnected computers that cooperate closely to provide a single integrated high-performance computing capability – A blade server: a computer server that has been designed to minimize the use of physical space and energy

9. Trends in distributed systems • Grid Computing – Is a form of cloud computing – Authorized users share processing power, memory and data storage – Use to support scientific applications

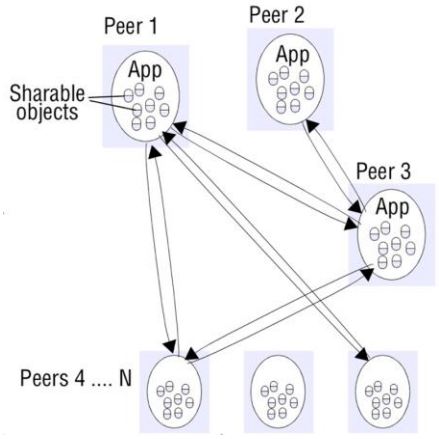
Question3: Among the challenges of Distributed Systems discussed in C1-Lec2, which problem in your opinion will accompany distributed systems into the future and why? (6)

ANSWER3: As grid computing technologies and infrastructures are being developed, suitable abstractions, methods, and tools will become necessary to enable application development, and software development of the components of grid computing environments.Grid computing will enable distributed applications with large numbers of involved components with dynamic interactions. This requires new approaches to understand and manage structure and behaviour, and the diversity of interactions among system components.This discusses emerging trends in distributed applications on large-scale and dynamic grid computing infrastructures. These trends allow us to identify the need to develop

suitable software models, methods and tools for grid computing environments, in order to help specify, compose, and develop dynamic distributed large-scale applications.

Question4: **The design of distributed systems can be described and discussed in three ways i.e Physical Model, Architectural Model and Fundamental Model. Describe the example of distributed system in Question1 with respect to these three models. (6)**

- **ANSWER4: Physical models are the most explicit way in which to describe a system; they capture the hardware composition of a system in terms of the computers (and other devices, such as mobile phones) and their interconnecting networks..**
- **Architectural models describe a system in terms of the computational and communication tasks performed by its computational elements; the computational elements being individual computers or aggregates of them supported by appropriate network interconnections..**
- **Fundamental models take an abstract perspective in order to examine individual aspects of a distributed system. three important aspects of distributed systems: interaction models, failure models, and; security models,**



Peer-to-peer architecture

Distributed systems:	*Early*	*Internet-scale*	*Contemporary*
Scale	Small	Large	Ultra-large
Heterogeneity	Limited (typically relatively homogenous configurations)	Significant in terms of platforms, languages and middleware	Added dimensions introduced including radically different styles of architecture
Openness	Not a priority	Significant priority with range of standards introduced	Major research challenge with existing standards not yet able to embrace complex systems
Quality of service	In its infancy	Significant priority with range of services introduced	Major research challenge with existing services not yet able to embrace complex systems

DISTRIBUTED SYSTEEM

Question5: For **the purpose of Inter Process Communication (IPC) in distributed systems, in what situation you will use UDP and TCP and why? (6)**

ANSWER5: The User Datagram Protocol (UDP) is a transport layer protocol for use with the IP network layer protocol. It provides a best-effort datagram service to an end system (IP host). UDP provides no guarantee for delivery and no protection from duplication, but

the simplicity of UDP reduces overhead from the protocol and can be adequate for some applications.

A computer may send UDP packets without first establishing a connection to a recipient. The computer completes the appropriate fields in the UDP header (PCI) and forwards the data together with the header for transmission by the IP network layer.

Typically, use UDP in applications where speed is more critical than reliability. For example, it may be better to use UDP in an application sending data from a fast acquisition where it is acceptable to lose some data points. You can also use UDP to broadcast to any machine(s) listening to the server.

In general:
TCP is for high-reliability data transmissions
UDP is for low-overhead transmissions.