CSN-341 Computer Networks
Assignment 2
(Architecture Of Skype And Peer-to-Peer Computing)

Group 20

Aniket Singh (16116005)
Harshal Mittal (16116020)
Harshit Bansal (16116021)
Samriddh Bhalla (16116057)
Vishal Sharma (16116076)

Q1) Explain the working of peer-to-peer architecture in detail.

A peer-to-peer network is a decentralized computer network that relies mostly on the resources of equal peers instead of a few powerful servers. In a pure peer-to-peer network there are no dedicated clients or servers, but instead all the peers can function as both clients and servers depending on the circumstances.

All the peers provide resources to the network. These resources can be anything from bandwidth and storage space to computing power depending on the purpose of the network. Thus if more nodes connect to the network and the demand on the system increases, the total capacity of the system also increases.
The process works as follows:

- We run peer-to-peer file-sharing software (for example, a BitTorrent program for downloading a movie) on your computer and send out a request for the file we want to download.
- To locate the file, the software queries other computers that are connected to the Internet and running the file-sharing software.
- When the software finds a computer that has the file we want on its hard drive, the download begins.
- Others using the file-sharing software can obtain files they want from our computer's hard drive.

Q2)Explain peer-to-peer computing along with its architecture.

Peer-to-peer computing may be considered another form of distributed computing which occurs between two nodes on a network. It is an emerging computing model that provides the ability to perform higher throughput computing by taking advantage of many networked computers to model a virtual computer architecture that is able to distribute process execution across a parallel infrastructure.

It uses the resources of many separate computers (peers) connected by a network (usually the Internet) to solve large-scale computation problems. This makes it possible to perform computations on large data sets, by breaking them down into many smaller ones, or provide the ability to perform many more computations at once than would be possible on a single computer, by dividing the labour between multiple peers.

Q3) What is VoIP?

VoIP stands for Voice over Internet Protocol. Phone calls can nowadays be replaced by calls over the internet, we only need both the sender and the recipient to have a computer with microphone and a speaker or a VoIP-enabled phone.

How does VoIP work?

- VoIP is a method for taking analog audio signals, like the kind we hear when when we talk on the phone, and turning them into digital data that can be transmitted over the Internet.

Examples of VoIP -

- We can take the famous example of Google Voice introduced by Google in order to support VoIP.
- We all are familiar with google hangouts, but google considers hangouts to be a second level to google voice, with google voice supporting only voice calls whereas hangouts supporting video calling as well. People can use their google voice numbers to dial up to anyone around the world at very low costs.
- Some other famous examples of VoIP are Skype, calling on various platforms like Facebook, WhatsApp, Slack, etc.

Q4) How does Skype work? Explain along with its architecture.

Skype was developed by the Danish entrepreneurs behind the KaZaA. Skype is a VoiP services that has its own protocol (Skype protocol) based on P2P networking. Skype uses 256 bit AES to encrypt communication between users but not end to end encryption. The Skype network comprises Skype clients, supernodes and a Skype authentication server. The Skype clients are also known as ordinary nodes of this decentralized network. A super node is an ordinary node that has a public IP address and sufficient CPU power, memory and network bandwidth.
The clients are directly connected to a supernode, usually multiple connections at a time. The Skype authentication server, as the name suggests, is a centralized server for the authentication of the user.

Connections are made using 2 different ways :
Firstly, if both of the servers are on public IP and if the receiver is on the buddy list of the sender then a direct TCP connection is used for calling and UDP for media transfer.
Secondly, if one or both of the clients are behind a UDP restricted firewall, relay nodes need to be established and transfer of media will occur through the relay. In case the receiver is not on the buddy list, then call placing is equal to user search and call signalling.