

Review Questions 8

Your Name:

Please print out this form (two-sided, if you can) and write your answers *legibly* in the spaces provided. If you can't write legibly, type.

1. Consider a node *A* in a BitTorrent session with neighbors *B*, *C* and *D*. Assume that *A* has no chunks of the file yet, *B* has chunks 1, 3 and 7, *C* has chunks 3, 4 and 5 and *D* has chunks 3, 5 and 7. Which chunks would *A* request first? Why?

BitTorrent uses the "rarest chunk first" policy, so that in this scenario A would request chunks 1 and 4 first since they are only held by B and C, respectively, while all other chunks are held by two nodes.

2. In a circular DHT, what are the advantages of having lots of shortcut routes? What are the drawbacks?

The advantage of lots of shortcuts is that they minimize the number of hops a query has to go through before it reaches the node that holds the (key,value) pair it is looking for.

The disadvantage of lots of shortcuts are a larger routing table, and more importantly in an environment where high churn is common, a high overhead for maintaining the freshness of the associate pointers.

3. Consider a circular DHT with shortcuts in which all packets are sent using UDP. In such a DHT, a server that leaves the DHT can leave behind "dangling routes" (that is entries in other servers' routing table that point to the now-departed server). The presence of dangling routes can cause user requests to be lost. Describe two distinct ways that the DHT might address this problem.

Because transmissions use UDP, nodes are not aware of failed packet deliveries that arise when they have a dangling route to a departed node.

One approach to overcome this problem is to associate a TTL with each route entry and delete it when the TTL expires. The TTL could be reset whenever receiving a packet from the node at the other end of the shortcut.

An alternative approach is to implement a liveness protocol such as regularly pinging the host on the other site of a shortcut. This is an instance of a soft-state protocol for managing shortcuts. Ping/Hello messages would be sent at fixed intervals, say, 30 secs, and a shortcut would be deleted if three pings in a row were left unanswered.