56	How can we reduce page splits		**1.Page splits can be reduced by introducing 'Fill-Factor' on the index data page of the table.** **2.Giving a proper length to column data type definition during table design is a good practice avoid unexpected row data volumn growth as Sql knows that the value cannot grow more than whats defined, ex. First_name varchar(100)**
57	How can we completely avoid page splits		**By introducing 'Identity' column.All the insertions will be forced to happen in order of the identity.However ,if other column values are updated with a larger value than the available space , page split still occurs.**
58	What is the difference between index scan and seek		**Scan – Index sScan means going through the entire leaf node level for the targeted data (sometimes back and forth in doubly linked list fashion)** **Seek – A seek is the traversal through different levels on the index tree till the leaf after the clustered key is obtained as a Lookup step. From there on it's a 'seek' into the clustered-index to fetch the actual data(which is eventually obtained at its leaf node).**
59	Does a cluster-key reside on the leaf node in a clustered index?		**No. The cluster key, by being on the non-leaf node, leads our way downwards towards the actual data (the other column values under search) pages at the leaf level.** **Its Yes for Non-clustered indexes as the leaf node in this case doesn't hold the data , which is on the leaf node of the clustered index data page.** **Suggestions for index concepts :**

			https://www.youtube.com/watch?v=JBHBUwFc0Ho https://www.youtube.com/watch?v=Amn1rg3ee80 https://www.youtube.com/watch?v=ITcOiLSfVJQ https://www.youtube.com/watch?v=8oBKA4hU4xM ********Favorites Below********** https://www.youtube.com/watch?v=JBHBUwFc0Ho&t=25s https://www.youtube.com/watch?v=p9FlnOPltA8 https://www.youtube.com/watch?v=oNArdPvouvU https://www.youtube.com/watch?v=xMOdcmNWdFs ********** Video describing SQL page (8KB data page on disk) https://www.youtube.com/watch?v=He8MRttysmY&t=12s
60	What is look-up in Indexes ?		When a seek operation after finishing at the non-clustered index (as per column value in where clause of query), has to go to the clustered index next,to get the actual data based on the seek result above, its called

(cluster-key)look-up . Once it gets the cluster key (as seek output), the query traverses further into clustered index to get the data for the column(s) mentioned in the select clause of the query.

Ex :

ID (Cluster key in clustered index)	**Name r(Non-clustered index key)**	**DOB (actual data the query is looking for)**
1	Arshad	343
2	Jasim	787
3	Arshad	746
4	Sultan	982
5	khalid	858
6	Arshad	354

select DOB (data at leaf node of clustered index)

from emp

where name ='arshad'; (Non clustered index on name column)

Step 1 (seek – non clustered index)

Seek is done first using where clause column value . i.e arshad.

Step 2 (lookup – clustered index for the required data mentioned in select clause)

ID of arshad is obtained as seek output. Using this output , 'lookup' is done on the clustered index is using the ID as the clustered key. The DOB of arshad is stored in the data page section at the leaf node of the clustered index.

61	Why is INCLUDE used in Non-clustered index definition?		**INCLUDE option makes look up data to reside along side the seek output so that the seek operation to the leaf is avoided, making the query much faster.** **Referring the example above, if DOB is INCLUDED along with the Lookup output (ID) , the DOB is instantly fetched and the need for lookup is completely eliminated.This is particulary useful when multiple values exist for the where clause column , i.e many people with name 'arshad' .**
62	Command to get index info on a table in a database,physical storage info of records in the table .		**DBCC IND (DBName,Tblname,-1)** **-1 gets all the page info including data pages,IAM pages (meta data) also.** **DBCC TRACEON(3604)** **DBCC PAGE (DBName,PageID,IAM_ID for the page)**
63	SQL Server architecture		**https://www.youtube.com/watch?v=G1mTb9JvyvE**
64	What is the algorithm used by Buffer Pool in the 'Storage Engine' architecture ?		LRU (Least Recently Used) algorithm.It is used by the Buffer Pool to manage the memory capacity of with respect to Plan Cache and Data Cache . To keep sufficient memory for new transactions coming in , it removes those plans and that data associated with the corresponding plan which is least recently used and frees up the space.
65	What is Soft Parsing and Hard parsing ?		When the buffer pool , after looking for an existing plan in the plan cache , fetches the corresponding data from data cache without going to the physical data files , its called , 'Soft-Parsing'. If the buffer-pool , could not fetch the data from the plan and data cache (bcos the query is executed for the first time) , it fetches the data from

			the physical data files . This is called Hard-Parsing. Useful video https://www.youtube.com/watch?v=G1mTb9JvyvE