SQL

DQL - select
DML - insert, update, delete
DDL - create, Alter, Remame, prop, Truncate
DCL - Grant, revoke
TCL - commit, rollback, savepoint

LANGuages supported by SQL
Q - Select
D - C, A, R, D, T
M - I, U, D
T - G, R
C - C, R, S

RDMS - Relational Database Management system

1433

MS-SQL Server

System Databases

Master
MODeL
MSDB
TempDB

Resource Database

ACID - properties.

Atomicity → The entire transcation ~~plac~~ takes place at once.

Consistency - The database must be Consistent before and after the trasaction.

Isolation - Multiple transactions occur independently without interference.

Durability → The changes of a successfull transaction occurs even if the system failure occurs.

1. Master

* file locations of the user databases.
* Login accounts
* Server configuration settings
* Linked servers information
* ~~Satat~~ startup stored procedures

2. Model

* A template database that is Copied into New DB.
* Options set in model will be applied to New DB's.
* Used to Create tempDB every time the server starts.

MSDB

* support SQL Server Agent
* SQL Server Management Studio (SSMS)
* Database Mail
* Server Broker
* History and metadata information is avalible in MSDB
* Backup and restore history of the DB's.
* History for SQL Agent jobs.

TempDB

* The tempdb is a shared resource used by SQL Server all users.
* Tempdb is used for temporary objects, worktables online index operations, cursors, table, variables
* It is recreated everytime that the server is restarted.
* As tempdb is non-permanent storage, backups and restores are not allowed for this DB.

Resource DB.

* Read-only hidden database that contains all the system information.
* Can't be backup the Resource DB.
* Must copy paste the file.

To check the size of log files for all DB's

dbcc sqlperf (logspace)

To check the properties of DB

sp_helpdb databasename.

Recovery models.

1. Simple Recovery models.
2. full " "
3. Bulk-logged " "

--change the recovery mode

use DB; for DB.

GO

-- Set recovery model to simple

ALTER DATABASE DBName

SET Recovery Simple;

GO

Simple recovery model

* Transaction log backups are not supported.
* Truncation of the transaction log is done automatically, there by releasing the space in system.
* You can lose data, as there are no transcation log backups.
* when in recovery mode, data in the T-log will not grow.

CHECK POINT

With Bulk-logged recovery model.

* Supports T-log backups
* As in full mode, there is no automated process o
trasaction log truncation.

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CHECK POINT

With Bulk-logged recovery model.

* Supports T-log backups
* As in full mode, there is no automated process of trasaction log truncation.
* used primarly for Bulk operations, such as bulk ~~insertes~~ insert, there by minimal.

full recovery model.

* supports transaction log backups.
* Little chance of data loss under the normal circumstances.
* No automated process to truncate the log, thus must have T-log backups.
* The T-log backups must be made regularly to mark unused space available for overwriting.

****

By taking full backup, it will not reduce the or truncate the logs.

By taking the log backup, it will reduce or truncate the logs. (full recovery model). periodically we will take the log Backup and it will release the space.

VLF (virtual logfile)
Log file size
- Less than 64MB Creates - 4 VLF
- Log file is Larger 64MB up to 1GB = 8VLF
- Log file is Larger than 1GB = 16VLF

To check log space

DBCC sqlpref (Logspace)

Restore with Recovery
Restore with NoRecovery.

Fragmentation

* shrinking the DB causes massive fragmentation and starts Rebulidling the indexs which logs more transactions to the log file so DB size increases. so Not recommended to shrink the Datafiles or DB

* Fragmentation, Indexes, checkpoint.

Central server mangement studio.

xp_readerrorlog
sp_who2 'active'

Indexes
the indexes are the special table in the DB which is used to ~~retri~~ retrive data fast from the tables.

Clustered Index
Not Required the Disk space.
clustered indexes sort the data rows in the tables or view based on their key values, there should be only one clustered index for one table. when a table does not have an index, it is referred as a heap.

Nonclustered index

① What is locking

Types of locking

1. RID - Row Identity
2. key
3. page
4. extent
5. Table
6. DB

~~Modes~~ Modes of locking

1. shared
2. update
3. exclusive
4. Intent
5. Schema (Deleting, change in the schema)
6. Bulk update

② Is it best pratice to have auto shrink enable on DB?

* NO,
1. Increases the index fragmentation, it causes low performance

③ What is different b/w named instance & Default instance

Default instance - while installing the if SQL Sever takes system name or host ~~to~~ name.

Named instance - if we give specific name while installing SQL Sever is named Instance.

We can 1-Default instance
49-named instance in SQL.

if we install any other version of SQL sever in same instance it can have only one ~~num~~ default instance.

Low to
RID - ROW level
key - Inside the ROW
page - page level - 8 k
extent - 8 pages "
Table - "
DB "

mode
S - shared lock - select.
U - update lo
X - exclusive lock

④ What is replication? Types? When to use each type?

1. Snapshot - Heart of replication

if they need last night data or only one day data that time we can go for snapshot replication

2. Transactional replication

when you need real time data we go for this replication. - one way communication publisher → subscriber

3. Merge replication

since between two servers publisher and subscriber - 2 way communication publisher → subscriber act as ← publisher act as subscriber

⑤ What is Transaction undo File (TUF) and in which process its gets created.

* During Log shipping TUF will create.

~~During~~ when the source side Flog backup is happens there some transcation who are in process they are not committed at the source side so SQL server put those transcation is file called TUF file.

During copy and restore job in the destination ~~server some space write will be left to the read~~ database will left some space to restore the uncommitted transactions. for the next operation it will read once transactions are committed it will read those in destination server so Both source and destination are in same page.

⑥ What is link server?

In any organization we have data coming from the different datasources, SQLserver, oracle, DB2 etc. to link all these we will create the link server and perform daily operations.

⑦ Difference b/w Backup/restore and Detach/Attach database?

A:- Backup/restore → logical files .bak file.
once data is corrupted or from disaster we can recover by using or restore using backups file

Detach/attach → .Mdf files, Mdf files and .Ldf files.
Detaching the database is Nothing but removing the data file and log file from the server.

⑧ The tran log of a database has grown huge, How would you shrink the log file?

Database → Tasks → shrink → logfile → give size.
if not happed then change the database to simple recovery and then shrink.

dbcc opentran()
if any open transactions are there we cant shrink log file

9) What will be your strategy when you need to migrate SQL Server 2008 to SQL Server 2012?

a) inplace ~~upgrag~~ upgrade

b) parallel upgrade

Backup preparation:

Backup all the user db's.

Script all SQL server Replication (If applicable)

Script all the login users (including database users)

Script all the linked servers (If applicable)

Script Database mail profile

Restoring

10) How Find the ~~log~~ space allocated to log file?

A. DB → Tasks → ~~files~~ shrink → files → log file

11) How would you determine the version and edition of SQL Server Instance you are working on?

Select @@ version.

12) How to assign the memory to the SQL Server

Right Click on instance → Memory → set Maximum memory.

You should not restart the Server. it will slowly release the memory.

Scanned with OKEN Scanner

13) How to trace the dead lock

Dead lock :- A dead lock occurs when two or more tasks permantely Block each other by each tasks having a lock on a resource that the other are trying to lock

We can trace the deadlock by using SQL profiler

Tools → SQLServer profiler → Connect → events → show all events → locks → Deadlock

14) Your company has a database for which the tran log grows very fast.
What strategies you should adopt to keep the translog reasonable?

Ans :- Frequent TLog Backups.

15) What is the difference b/w "Restore with Norecovery" and "Restore with standby".

Restore with Norecovery

- DB is not usable
- Remains in Restore mode
- Next restore sequence can be done
- doesn't rollback any uncommitted transaction

Restore with standby

- creates a standby file
- DB is in read only mode
- DB can be brought back to no recovery mode
- Can only be done in offline restore
- Doesn't work on online restore.

16) what are the two types of authentication modes in SQL server.

i) windows authentication ii) SQL mixed mode Authentication (windows + SQL server)

17) If you need to find all the processes running by specific login, how would you do that?

Ans By running Active monitor

Instance → rightclick → Active monitor → Login.

18) How would you find out that how log SQL server Instance is running?

Ans:- Select sqlserver_start_time from sys.dm_os_sys_info

(or)

TempDB creation.

19) How would you find out how many transactions/sec SQL server is performing?

Ans - Performance Monitor → SQL Add → SQL Server → Database

↑

Administrative tools

20) How would you find currently running quires on SQL server.

sp_who

sp_who2

Activite monitor

SQL server profiler.

dbcc inputbuffer (spid)

21) You need to create full Backup of all the databases from one of the SQL server Instance every night If any New db is created that should also become the part of backup process.
what would be your approach to perform this?

A:- We should add DB to the Maintaine plan along with other DB's.

2:-) users start complaining that

Blocking

→ Blocking occurs when one SPID holds a lock on a specific resource and a second SPID attempts to acquire a conflicting lock type on the same source.

Dead lock

A Dead lock occurs when two or more tasks premanently Block each other by each task having a lock on a resource which the others tasks are trying to lock.

Lazy writer

Lazy writer flushes the dirty pages from the Buffer cache in the memory.
Buffer cache is an area of memory used to store data pages Read from disk.

check point:-

It writes all modified pages from buffer cache to disk. also writes the log records from log buffer to physical files.

(1) Master key

(2) Create certificate

(3) Create database encrypted key protected by certificate

(4) Enable encryption on database (Take log backup)

Instance level — BD²PS⁴ { BD²PS⁴, ABD⁴OS

BD²PS⁴

Database level

ABD⁴OS

B - Bulk Admin

D - DBA admin

D - Db Creator

P - process admin

S - system_admin

S - Security admin

S - sysadmin

S. Setup admin

BD²PS⁴ — Inst

ABD⁴OS — DB level

Acy admin,

Backup operator —

Dater,

Data writer

DDL admin,

Deny datareader

Deny datawriter

DB-owner

DB-securityadmin

A -
B -
D4 } BD²PS⁴

Instance

BD²PS⁴ DL

ABD⁴OS DL, DL, DL

Instance level

RID

Key

Page

Extent

TABLE.

DB

Shared lock

Update lock

Exclusive lock

Intent (SI, IX, SIX)

Schema (Sch-M, Sch-S)

Bulk update

Database

BD²PS⁴

ABD⁴OS

BD²PS⁴

ABD²OS

ABD⁴OS

BD²PS⁴ — Instance

ABD⁴OS → Database

Memory Calculation

(04) 128 GB

RAM = value

RAM - value = value1

value1 × 1024 = final value

$\frac{RAM}{4}$ = value

32 - 8 = 24

24 × 1024 = final value

memory to SQLServer

ABD4 08

BD2P84, ABD4OS

BD P84

Bulk-dl

Db

Disc

prom

$\frac{RAM}{4}$ = va

RAM value = 1

1 × 1024.

Pages :-

Basic unit of the SQL is page

the transcation will be written on the pages.

If the data is modifying on the page is called dirty pages.

If the data is modified or committed is called clean pages.

1 Page = 8KB 8 pages = 1 extent

Instance-level

BD^2PS^4

B- Bulk Admin

D- Db Creator

D- Disk admin

P- process admin

S- Sercurity admin

S- Server admin

S- setup admin

S- sys admin

DB level

ABD^4OS

DB- Access admin

- Backup operator

- Data reader

Data writer

DDLadmin

Deny data reader

Deny Data writer

DB owner

DB security admin.

Isolation level

1. Read comitted

2. Read un comitted

3. Repeatable Read

4. serializable

* A user is associated with a specific dB and defines the prem-issions and acess rights with in DB.

* A login can be mapped to one or more DB users, allowing controlled access to the DB objects.

clustered and non-clustered index

clustered index:

A clustered index is used to define the order or sort the table or arrange the data by alphabetical order just like dictionary.

Non-clustered index:

A non-clustered index collects the data at once place and records at another place.

MAXDOP

Max DOP is a server configuration option for running SQL server on multiple cpu's.

Difference b/w push and pull replication

push replication

where Agent runs. or Distribution Agent runs at the distributor (primary server). (snapshot, transactional)

where in pull replication agents run at the subscribers. (Merge replication).

SQL server patching & issues → Applying the updates on the sql server.

1. To avoid the Bugs
2. To enhance the security

How many types of updates are there

1. Service pack - Major update
2. Cumulative update - Minor update
3. GDR - General Distribution Release } Hot fixes.
4. QFE - Quick fix engineering

1. Service pack

* upto sql server 2016 we have this SPs updates.

These updates will be release atleat a year gap

sp1, sp2, sp3, sp4

2-time need to patch

1st time - sp (service pack)

2nd time - CU (cumulative update)

Precautions before patching (some points)

1. check the number of instances running in the server
2. check How many sql services are up and running in that machine or server.
3. we have to check enough free space is there or not in the c-drive of the Machine. (3GB should be there)

   collection of files
   - .msi - Microsoft Installer files
   - .msp - Microsoft patch files

4. check DB state
5. check the server Name

→ We can patch all the instances which are same version at one time.

** → we can see the logs of patching issues or patching is failed in the "summary.txt file" and "Detail.txt file"

Removing the patching.

1. when SQL server is partially patched. will remove patch
2. when there is a compatibility issue " " "

Errors

we can get error "missing .msi and .msp files."

Installation & Errors

License { standard, enterprise

1. specific features
2. shared features

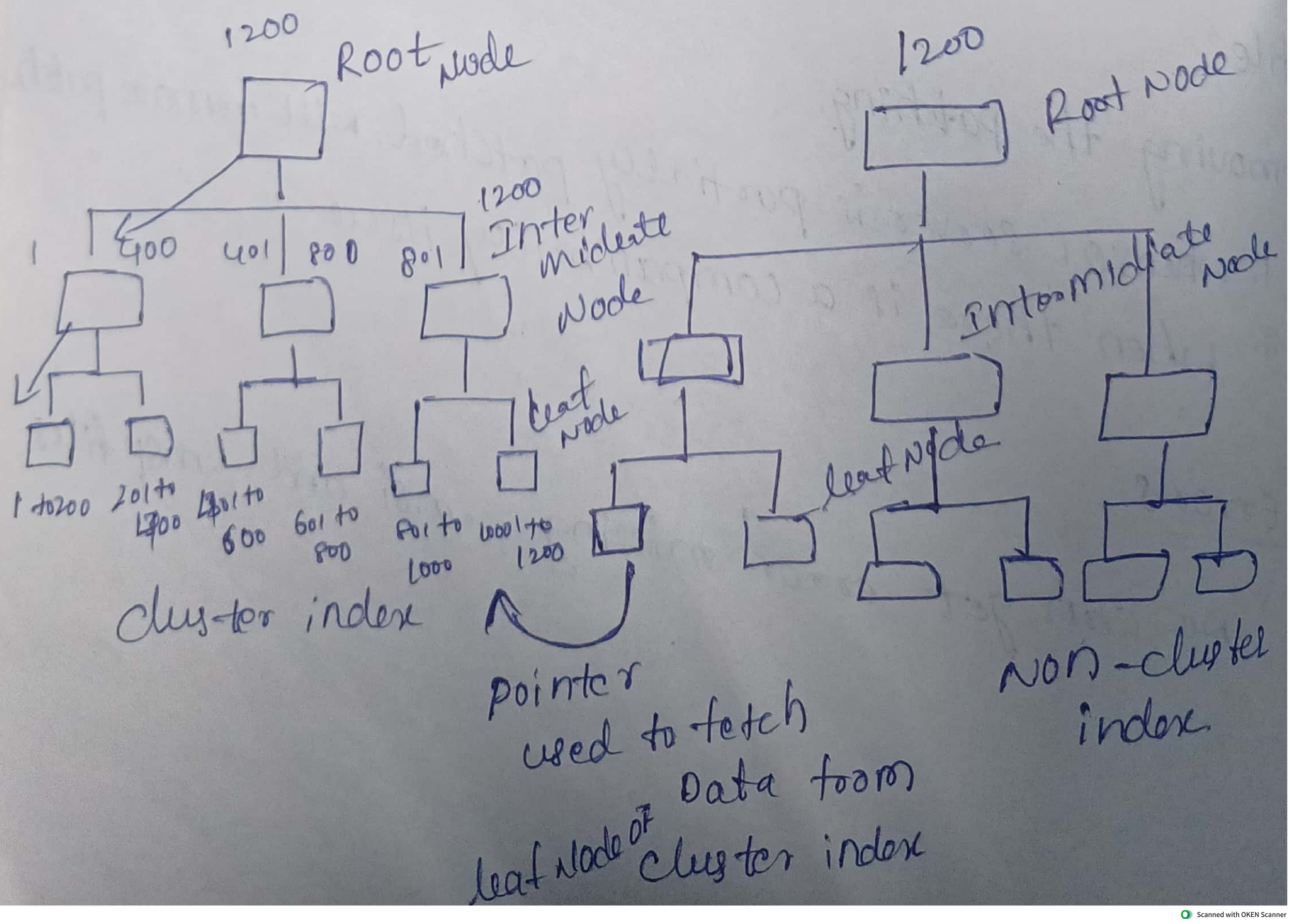
Where to check installation failures

1. Summary.txt file
2. Detail.txt file
3. Event veiwer → Application logs } Installation, patching, upgrading

Common Reasons the installation can be failed

1. premissions
2. Drive/paths are missing
3. Software is corrupted
4. not enough memory/not enoug storage
5. If you don't restart the machine.

Clustered and non-clustered index



* Cluster index with arrange the Data in the alphabetical order like dictonary.
* when can have only one clustered index per table.

Non-clustered index.

* non-clustered index will collects data at one place records at another place, non-clustered
* have pointer which used to fetch the data from the leaf node of the clustered index
* we can create more than one non-clustered in the table.

Database statitks.

It the contains the information about each table like, data type, indexes etc---

when ever we rebuild the indexs the Database statitics will be updated.

when ever we re-orginize the indexes the Database statitics will not be updated.

SQL Server agent:-

SQL server Agent can help you Automate routite tasks, optimize database performance.

SQL Login :-

* SQL login is used for Authentication.
  login is created at the SQL server instance level.

SQL Server user

* SQL Server user is used for Authorization.
  user is created at the SQL server Database level

Query Store :- is a Database level setting.

Query store is used to capturing a history of executed queries, query runtime execution statticks, execution plans against a specific database.

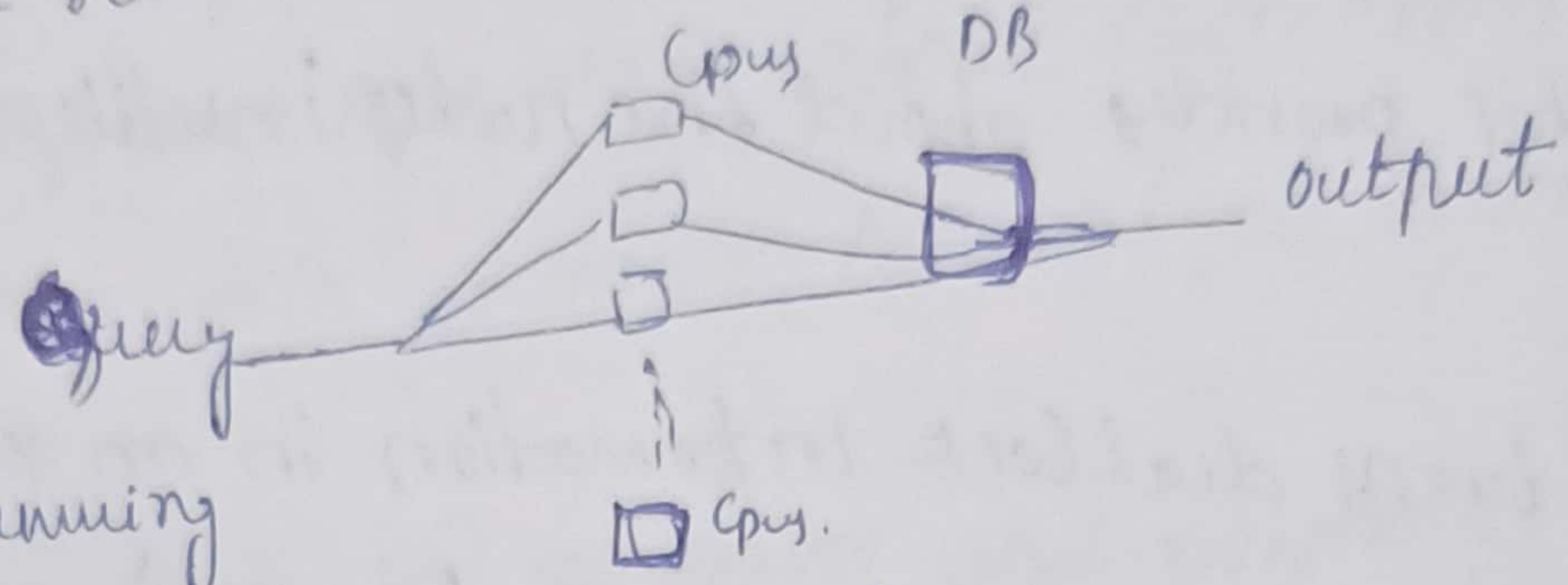
Common scenarios where the SQL servery query store future can be useful.

* find the most expensive queries for cpu, I/O, memory etc
* get full history of query executions.
* to determine how many times a query was executed in given range of time.
* ~~A new execution plan generated by query engine is worse than the older one.~~

Note :- SQL Server query store cannot be enabled for master or tempdb database.

Max degree of parallelism – Maxdop

It is SQL Server configuration option enables to run the SQL Server on all the logical cpus.

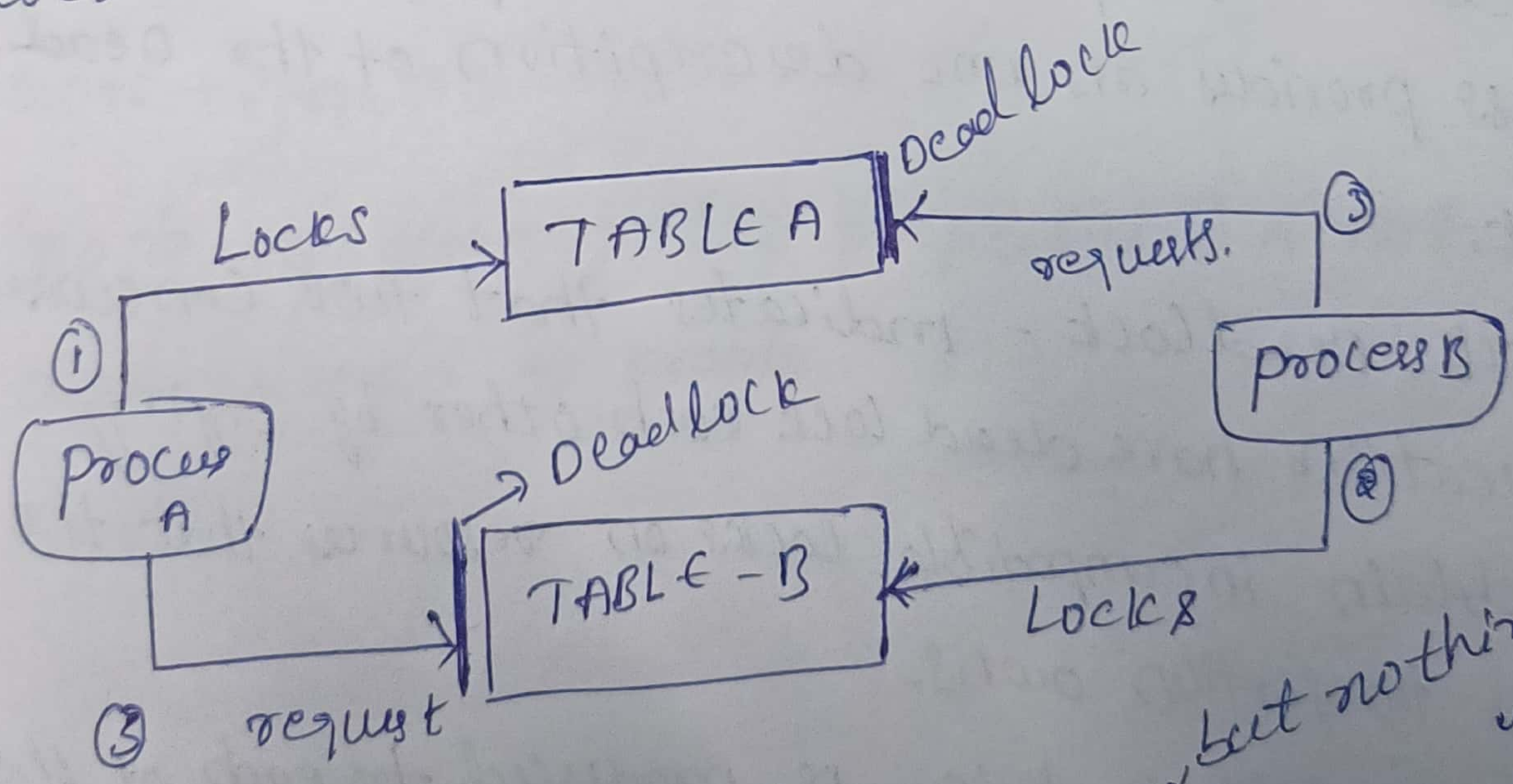


for long running query

Default Max degree of parallelism will be "zero" in the SQL Server.

Dead lock :-

A Dead lock occurs when two or more tasks permanently block each other, each task having a lock on a resource.



* Dead lock will be captured but nothing we can't see in the SQL Server error log or the windows event log.

Dead lock information can be captured in the SQL Server log or by using profiler / server-side Trace.

Trace flags.

if you want capture this information in SQL server error log you need to enable one or both trace flags.

. 1204 - this provides about the nodes involved in the dead lock

. 1222 - returns dead lock information in an XML formate.

DBCC TRACEON (1204, -1)

profiler / server-side Trace.

profiler works without the trace flags being turned on and there are three events that can be captured for dead locks.

Each of these events is in the Locks event class.

1. Dead lock Graph: The dead lock graph event class provides an xml description of the Dead lock.

2. Lock: Dead lock - indicates that two concurren trascations have dead lock each other by trying to obtain incompatible locks on resources that the other transcation owns.

3. Lock: Dead lock chain - is produced for each of the events leading up to the dead lock.

SQL Servers → Tools → profiler → General (select blank) drop down then go to events section → Locks → dead lock graph

SQL Server profiler.

* Is a graphical user interface to SQL trace for monitoring instance of the Database engine. You can capture save data about each event monitoring on to a file or table to analyze later.

Isolation levels in SQL Server and violations

Read un-comitted

Read Comitted.

How to send email notification when a job fails in SQL Server

1. SQL Server agent.
2. Stored procedure

→ SQL Server Agent → jobs → Notifications → E-Mail

If e-mail not there

Goto → operators → Name → E-Mail Name

Go to SQL Server agent → properties → Alert → enable database email. → profile.

Scanned with OKEN Scanner

How to Configure a database Mail?

* Database Mail is an enterprise solution for sending email message from SQL Server Database engine or Azure SQL Managed instance

* Using Database Mail, your database applications can send e-mail messages to users. The messages can contain query results, job completion. Can also include files from any source of your Network.

How to enable and configure Database Mail using the Database Mail configuration wizard.

* Use the "DatabaseMail Xps" option to enable Database Mail on your server.

0 : Database Mail isn't available (default)

1 : Database Mail is available

This setting doesn't require server restart.

587

SSMS → Management → Database Mail

A Database email supports three methods of Authentication (SMTP)

1. windows Authentication
2. Basic "
3. Anonymous "

FillFactor

fill factor is a setting that is applicable to indexes in SQL Server. The fill factor value determines how much data is written to index page when it is created or rebuilt. By default the fill-factor value is set to 0.

Types of Lock in SQL.

1. shared Lock

it allows multiple transcantions to read a resource simultaneously but not modify it. other transaction can also acquire a shared lock on the same resource

2. Exclusive lock.

it allows a transcation to both read and modify a resource. No other transaction can acquire any type of lock on the same resource while an exclusive lock

3 update lock.

it used to prevent a dead lock scenario when a transcations intends to update a resource.

4. schema lock.

it used to protect the structure of database objects.

5. Bulk update lock.

it is used during bulk insert operations to improve performance by reducing the number of locks req.

6. Row level lock

7 Page-level lock

8. Table-level lock.

LOG SHIPPING

* Concept
* prerequisites
* Configuration
* failover
* Reverse log-shipping
* Advantages
* Disadvantages.

* Concept

* SQL Server Log shipping allows you to automatically send transcation Log Backups from a primary database on a primary server instance to one or more secondary databases on separate secondary server instances.

* The transcation Log Backups are applied to each of the secondary databases individually.

* An optional third server instance, know as the monitor server records, the history and status of backup and restore operations and, optionally, raises alerts if these operations fail to occur as ~~Sedu~~ scheduled.

Log shipping consists of three operations

1. Backup the transaction log at the primary server instance
2. Copy the transaction log file to the secondary server "
3. Restore the log backup on the secondary server instance.

4 Jobs.

1. Backup job
2. Copy job
3. Restore job
4. Alter Job.

Pre-requisites:-

* The primary database must be in full or bulk-logged recovery model.
* The log-shipping stored ~~procedures~~ procedures requires membership in the sysadmin fixed server role.
* Data base name and collation setting of server must be same.
* shared folder should be there between primary and secondary servers.
* service accounts must have read/write permissions on the shared folder.
* SQL server agent must be running.

Restore with NO recovery

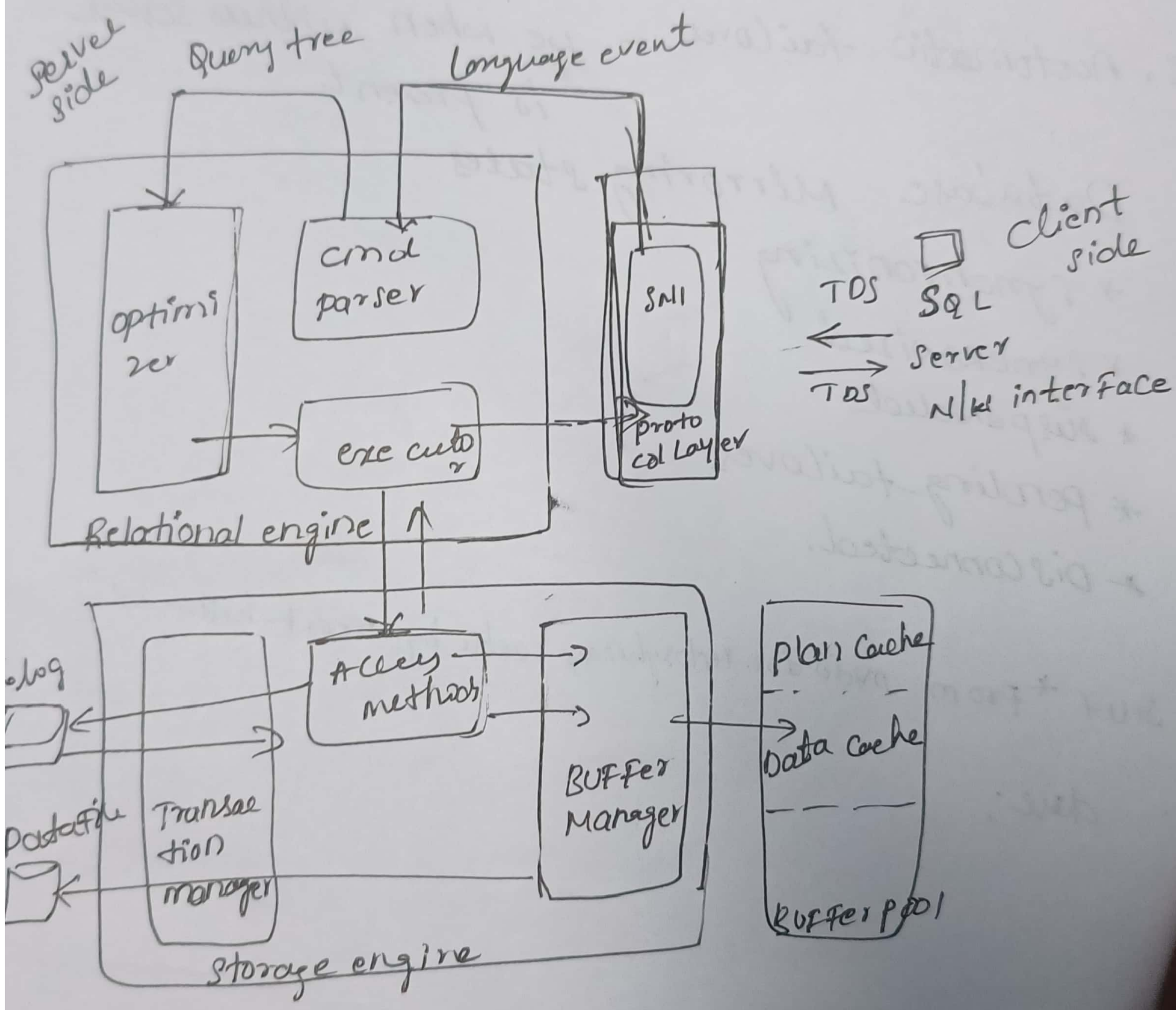
If the user is restoring a database using multiple backup files, NO recovery option is used for each restore except the Last. The Restore Database with NORecovery option puts the database into restoring state so that additional Backups can be restored and no users can access the database in this state.

If user wants to recover database without using additional Backups, ~~do~~ Restore Database with recovery option will be used to bring database online again making it usable for users.

Database mirroring. — need work on this

1. How to prepare DB for Mirroring
2. How to configure principle server
3. How to configure Mirror server
4. How to configure Witness server
5. How to failover
6. permissions required for Mirror setup.

Listener port 5022



3- Operating modes

→ High safety mode

→ High performance - only force failover - Asynchronous mode

→ High safety with withess.

3 modes of failover

1. Manual failover - high safety mode
2. Force failover - we do in principal server is not avaliable
3. Automatic failover - we when withess server is present.

Database Mirroring states

* synchronizing
* synckronized
* suspended
* pending_failover
* Disconnected.

Select * From msdb.dbo.restorehistory order by restore_history_id desc;

Data page ✓

Index " ✓

Global allocation map

Shared global Allocation MAP. IAM

Data ch Differe chan 9

Bulk change map.

page free space

GAM

SGAP Bure,

IAM