

ADVANCED RDBMS

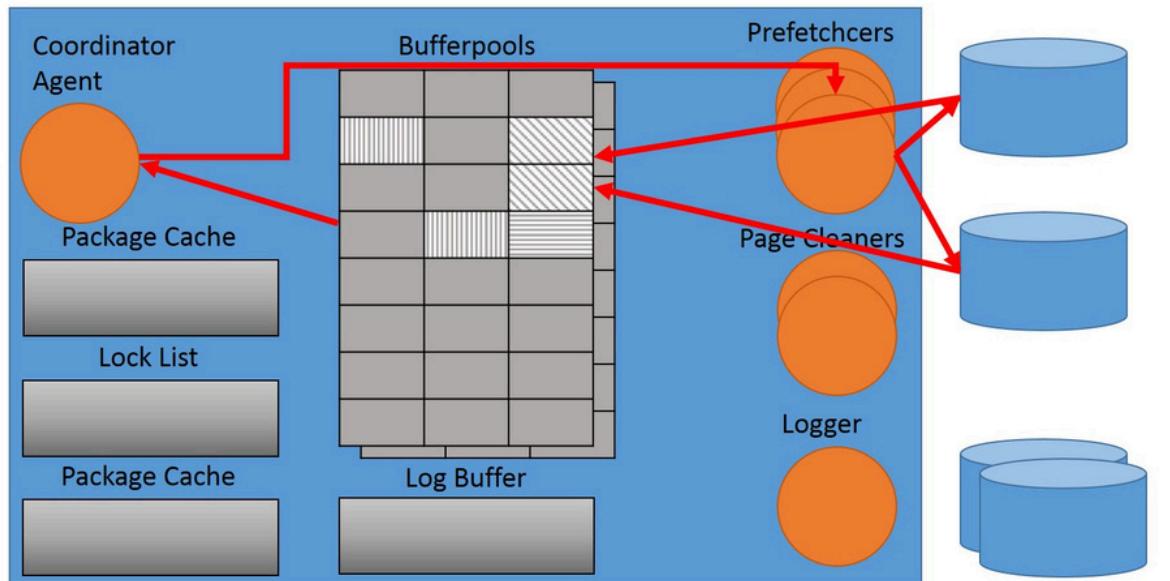
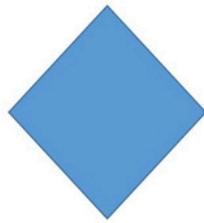
[UNIT-1]

Samajh gaya. **Ultra-EZ + short** version chahiye.
No gyaan, no long bakwaas. Seedha exam-ready.

DB2 Client

DB2 Server

SAN or Disks



🔍 Investigating DB2 Locking (EZ & Short)

Locking problem kab hoti hai?

- Query wait karti hai
- System hang lagta hai
- Error aata hai: SQL0911, SQL0922

Sabse pehle kya check kare?

```
db2 get db cfg for mydb | grep LOCKTIMEOUT
```

👉 Batata hai kitni der wait karega

Current locks kaise dekhein?

db2 get snapshot for locks on mydb

👉 Kaun lock hold kar raha hai

Kaun wait kar raha hai?

db2 get snapshot for lockwaits on mydb

👉 Waiter + Blocker dono dikhenge

Application details kaise dekhein?

db2 get snapshot for applications on mydb

👉 User + status milega

Lock hataana ho to (last option)

db2 force application <handle>

⚠️ Transaction rollback ho jaata hai

🧠 One-line yaad rakh

Snapshot → Blocker → Force

✍️ Exam-ready 3-line answer

Investigating DB2 locking mein current locks, lock waits aur blocking applications identify ki jaati hain. Iske liye DB2 snapshots aur configuration parameters jaise LOCKTIMEOUT ka use hota hai. Blocking application ko force karke issue resolve kiya ja sakta hai.

[UNIT-4]

🔧 Problem Determination in DB2 (Acche se)

Problem determination hota kya hai?

Problem determination = jab DB2 ya application mein issue aaye, uska exact reason find karna

Issue ho sakta hai:

- Database slow
- Query hang
- Application error
- DB crash
- Lock wait / deadlock

👉 Simple words:

Problem aayi → kyun aayi? → kahan aayi? → kaise fix hogi?

Problem determination kyun important hai?

Kyuki:

- Har problem DB2 ki galti nahi hoti
- Kabhi application galat hoti hai
- Kabhi configuration
- Kabhi hardware / disk

✗ Guess mat karo

✓ Evidence ke saath root cause nikalo

Problem determination ka STANDARD FLOW (EXAM GOLD)

Problem notice

↓

Error message dekho

↓

Logs check karo

↓

Resource check karo

↓

Lock / performance check

↓

Root cause

Is flow ko yaad kar liya → aadha answer ban gaya.

Step-by-Step Problem Determination

◆ STEP 1: Problem identify karo

Sabse pehle clear karo:

- Slow hai ya fail?
- Single user ya sab?
- Abhi start hua ya pehle se?

Example:

- “Query chal hi nahi rahi”
- “Sab users wait kar rahe hain”

👉 Ye **scope define** karta hai

◆ STEP 2: Error message dekho (MOST IMPORTANT)

DB2 hamesha error deta hai:

- SQL0911 → deadlock / timeout
- SQL0954 → insufficient resources
- SQL0901 → system error

👉 Error code = **direct hint**

Exam mein likhna:

Error message problem determination ka first clue hota hai.

◆ STEP 3: Diagnostic logs check karo

DB2 ka main log:

`db2diag.log`

Ye batata hai:

- Internal errors
- Crashes
- Deadlocks
- Disk / memory issues

Real life mein:

80% problems ka answer yahin mil jaata hai

◆ STEP 4: Resource check karo

Kabhi DB slow hota hai kyuki resource hi nahi bache.

Check:

- Disk full?
- Memory kam?
- CPU 100%?

Commands:

```
db2 list tablespaces show detail
```

👉 Tablespace full = inserts fail

◆ STEP 5: Locking & concurrency check

Agar users wait kar rahe hain:

```
db2 get snapshot for lockwaits on mydb
```

Yahan pata chalta hai:

- Kaun block kar raha
- Kaun wait kar raha

👉 Long transaction = common villain

◆ STEP 6: Performance check (Queries slow?)

Agar DB chalu hai par slow:

- Bad SQL
- Missing index
- Full table scan

Tool:

explain plan for select * from table;

👉 Plan batata hai query kaunsa rasta le rahi hai

◆ STEP 7: Root cause decide karo

Ab decide karo problem ka source kya hai:

| Source | Example |
|-------------|------------------|
| Application | Commit nahi |
| SQL | No index |
| Locking | Long transaction |
| Space | Tablespace full |
| Config | Memory kam |

👉 Fix yahin se decide hota hai

Common DB2 Problems + Reason

| Problem | Likely Reason |
|-------------|------------------|
| Query hang | Lock wait |
| DB slow | Bad SQL / index |
| Insert fail | Tablespace full |
| App crash | DB down |
| Timeout | Long transaction |

Exam-ready Definition (5 lines)

Problem determination DB2 mein issues jaise performance degradation, errors, locking ya failures ke root cause ko systematically identify karne ki process hai. Isme error messages, diagnostic logs, system resources, locking aur performance tools ka use kiya jaata hai taaki correct corrective action li ja sake.

🧠 One-line yaad rakh

Problem determination = Observe → Check logs → Check locks → Find root cause

Application Issues & Performance (WITH SOLUTIONS)

Issue: Long Transactions (COMMIT nahi)

Problem

- Application UPDATE/INSERT karti hai
- COMMIT nahi karti
- Locks lage rehte hain
- Dusre users wait karte hain

Example

```
update employee set salary=50000 where emp_id=1;
```

-- commit nahi hua

Solution

```
commit;
```

- ✓ Short transactions rakho
- ✓ Kaam khatam → commit turant

Issue: Slow SELECT Queries

Problem

- SELECT *
- Badi table
- Unnecessary data fetch

Example

```
select * from employee;
```

Solution

```
select emp_id, name from employee;
```

- ✓ Sirf required columns lo
- ✓ Network + DB load kam

Issue: Missing Index

✗ Problem

- WHERE clause use ho raha
- Index nahi
- Full table scan

🔍 Example

```
select * from employee where emp_id = 10;
```

✓ Solution

```
create index idx_emp_id on employee(emp_id);
```

- ✓ Search fast
- ✓ Query time drastically kam

Issue: Wrong Isolation Level (Too Strict)

✗ Problem

- Application har jagah RR use kar rahi
- Extra locks
- Low concurrency

🔍 Example

```
set current isolation rr;
```

✓ Solution

```
set current isolation cs;
```

- ✓ CS = DB2 default
- ✓ Balance of safety + performance

Issue: Too Many Database Calls

✗ Problem

- Loop ke andar query
- Har row pe DB hit

🔍 Example

```
for(each emp){
```

```
select * from employee where emp_id = ?;
```

```
}
```

✓ Solution

- Single query use karo

```
select * from employee where emp_id in (1,2,3,4);
```

✓ Network calls kam

✓ Response fast

Issue: No Batch Processing

✗ Problem

- 1 record = 1 insert
- Thousands of inserts → slow

🔍 Example

```
insert into employee values (...); -- repeated
```

✓ Solution

- Batch insert / LOAD use karo

```
db2 load from emp.del of del insert into employee
```

✓ Bulk data fast load hota hai

Issue: Application Holding Locks Too Long

✗ Problem

- User screen open
- Transaction open
- Locks held

✓ Solution

- UI logic fix karo
- Read + update alag rakho
- Idle time mein transaction open mat rakho

📌 ONE-TABLE SUMMARY (EXAM GOLD)

| Issue | Problem | Solution |
|------------------|----------------|----------------------|
| Long transaction | Lock wait | Commit fast |
| Slow SELECT | Extra data | Select specific cols |
| Missing index | Full scan | Create index |
| Wrong isolation | Too many locks | Use CS |
| Too many calls | Network delay | Reduce DB calls |
| Bulk inserts | Slow inserts | LOAD / batch |

⚙ Application Performance Tools in DB2

Tool ka kaam kya hota hai?

👉 Ye tools batate hain application slow kyun hai

- Query slow hai?
- Lock wait hai?
- Index use nahi ho raha?

SNAPSHOT (Basic & Exam Favourite)

🔧 Tool:

```
db2 get snapshot for applications on mydb
```

🧠 Kya batata hai?

- Kaun si application active hai
- Kaun wait kar rahi hai
- CPU time, locks

👉 Use kab?

- Users bolen “system slow”
- Kaun app problem kar rahi pata karna ho

LOCK SNAPSHOT (Locking issues ke liye)

🔧 Tool:

```
db2 get snapshot for lockwaits on mydb
```

🧠 Kya batata hai?

- Kaun wait kar raha
- Kaun block kar raha

👉 Use kab?

- Query hang
- Lock wait / deadlock

EXPLAIN PLAN (Most Important 🔥)

🔧 Tool:

```
explain plan for
```

```
select * from employee where emp_id = 10;
```

🧠 Kya batata hai?

- Query ka execution path
- Index use ho raha ya nahi
- Full table scan ho raha ya nahi

👉 Use kab?

- Query slow ho
- Index ka doubt ho

DB2PD (Real-time Tool)

🔧 Tool:

```
db2pd -db mydb -locks
```

🧠 Kya batata hai?

- Live locking info
- Active transactions

👉 Use kab?

- Production system
- Instant status chahiye

DB2DIAG.LOG (Problem + Performance)

🔧 Tool:

db2diag.log

🧠 Kya batata hai?

- Errors
- Deadlocks
- Resource issues

👉 Use kab?

- Crash
- Unknown performance drop

🧠 ONE-LOOK SUMMARY (EXAM GOLD)

| Tool | Use |
|---------------|----------------------|
| Snapshot | Active apps & waits |
| Lock snapshot | Locking issues |
| Explain plan | Query optimization |
| db2pd | Real-time monitoring |
| db2diag.log | Errors & failures |

✍ Exam-ready 4–5 line Answer

DB2 application performance tools jaise snapshots, explain plan, db2pd aur diagnostic logs application ke performance issues identify karne ke liye use hote hain. Ye tools slow queries, locking issues aur resource bottlenecks ko analyze karne mein madad karte hain.

Security in DB2 (Simple & Clear)

DB2 Security ka main goal

- 👉 Unauthorized access rokna
- 👉 Right user ko right permission dena

Simple line:

Data safe + controlled access = DB2 security

DB2 Security ke 3 MAIN PARTS (EXAM GOLD)

- ◆ 1. Authentication
- ◆ 2. Authorization
- ◆ 3. Privileges

Authentication (Kaun ho tum?)

Matlab:

- 👉 User ka identity check

DB2 OS se poochta hai:

- Username valid hai?
- Password sahi hai?

📌 Example:

```
db2 connect to mydb user user1 using pass123
```

- ✓ User valid → login allowed
- ✗ Galat password → access denied

Authorization (Tum kya kar sakte ho?)

Matlab:

👉 Login ke baad **permissions check**

Examples:

- SELECT kar sakta?
- INSERT kar sakta?
- DROP table kar sakta?

Authorization levels:

- Database level
- Table level
- Column level

Privileges (Exact power kya hai?)

Common privileges:

- SELECT
- INSERT
- UPDATE
- DELETE

Grant example:

```
grant select on employee to user1;
```

👉 user1 sirf data dekh sakta hai

Revoke example:

```
revoke select on employee from user1;
```

👉 Access wapas le liya

Roles (Group permissions – smart way)

Problem:

Har user ko alag-alag grant karna mushkil

Solution:

👉 **ROLE**

```
create role clerk;
```

```
grant select on employee to role clerk;
```

```
grant role clerk to user1;
```

- ✓ Easy management
- ✓ Enterprise standard

Schema-based Security

Example:

```
grant select on schema hr to user1;
```

👉 User ko poore HR schema ka access

DBA / Administrative Authorities

Special users jinke paas **extra power** hoti hai:

| | |
|------------|------------------|
| Authority | Kaam |
| SYSADM | Full control |
| DBADM | Database control |
| SECADM | Security manage |
| DATAACCESS | Data access |

📌 **SECADM** sabse important for security

Security Levels (One Look)

| | |
|----------------|-----------------|
| Level | Control |
| Authentication | Login |
| Authorization | Allowed actions |
| Privileges | Exact rights |
| Roles | Group access |

CONNECT (Authentication)

Query

```
db2 connect to mydb user user1 using pass123
```

Explanation

- connect to mydb → kis database se connect hona hai
- user user1 → kaun connect kar raha hai
- using pass123 → password

👉 DB2 OS se poochta hai:

“Ye banda real hai ya fake?”

- ✓ Password sahi → login
 ✗ Galat → access denied

GRANT SELECT (Basic Permission)

Query

```
grant select on employee to user1;
```

Explanation (line by line)

- grant → permission de raha hoon
- select → sirf data dekhne ki power
- on employee → kis table pe
- to user1 → kisko

👉 user1:

- data dekh sakta hai
- ✗ update / delete nahi kar sakta

GRANT MULTIPLE PRIVILEGES

Query

```
grant select, insert on employee to user1;
```

Explanation

- select → data read
- insert → new row add
- Update/delete abhi bhi allowed nahi

👉 Fine-grained control

REVOKE (Permission wapas lena)

Query

```
revoke insert on employee from user1;
```

Explanation

- revoke → power chheen raha hoon
- insert → kaunsi power
- from user1 → kisse

👉 user1:

- SELECT kar sakta
- ✗ INSERT nahi

⚠️ Revoke = dangerous but powerful

ROLE CREATE (Group Permission)

Query

```
create role clerk;
```

Explanation

- role → permission ka bundle
- clerk → role ka naam

👉 Ab permissions user ko nahi, **role ko denge**

ROLE ko privilege dena

Query

```
grant select on employee to role clerk;
```

Explanation

- Employee table ka SELECT access
- Ab ye power **clerk role** ke paas hai

ROLE ko user ko dena

Query

```
grant role clerk to user1;
```

Explanation

- user1 ko clerk role mil gaya
- Jo bhi clerk role ke paas hai → user1 ke paas bhi

👉 Enterprise best practice

SCHEMA LEVEL SECURITY

Query

```
grant select on schema hr to user1;
```

Explanation

- schema hr → HR schema ke saare objects
- select → read-only access

👉 user1:

- HR.EMP
 - HR.DEPARTMENT
- sab ka SELECT kar sakta hai

ADMIN AUTHORITIES (High Power)

Query

```
grant dbadm on database to user1;
```

Explanation

- dbadm → database admin power
- user1:
 - tables create/drop
 - users manage ✗ (security nahi)

⚠ Heavy power – limited logon ko hi do

1 SECADM (Security Boss)

Query

```
grant secadm on database to user1;
```

Explanation

- user1 ab:
 - grant/revoke karega
 - roles manage karega

👉 Security ka bhagwan

🧠 ONE-LOOK SUMMARY (YAAD RAKH)

| | |
|--------------|------------------|
| Query | Matlab |
| CONNECT | Login |
| GRANT | Permission dena |
| REVOKE | Permission lena |
| ROLE | Group access |
| SCHEMA GRANT | Area access |
| DBADM | DB control |
| SECADM | Security control |