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# CS246: Database Management Systems Lab

Week # 05 (1 Questions, 84 Marks)

Lab session: AL1

Held on: 31-Jan-2025 (Mon)

Lab Timings: 14:00 to 17:00 Hours    Pages: 6

Submission time: 16:45 Hrs, 31-Jan-2025

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Important information:

1. Some of the tasks are so designed to emit errors when SQL statements are invoked. You should make an informed effort to find the cause of the errors. You do not need to resolve the errors.
2. Write all the SQL statements in a text file named with `your-roll-number.sql` file name & extension and upload. Replace the text `your-roll-number` with appropriate roll number.
3. Refer to table creation document
4. Refer to table modification document
5. Refer to insert statement
6. Refer to update statement
7. Refer to delete statement
8. Refer to select statement
9. Refer to regular expressions

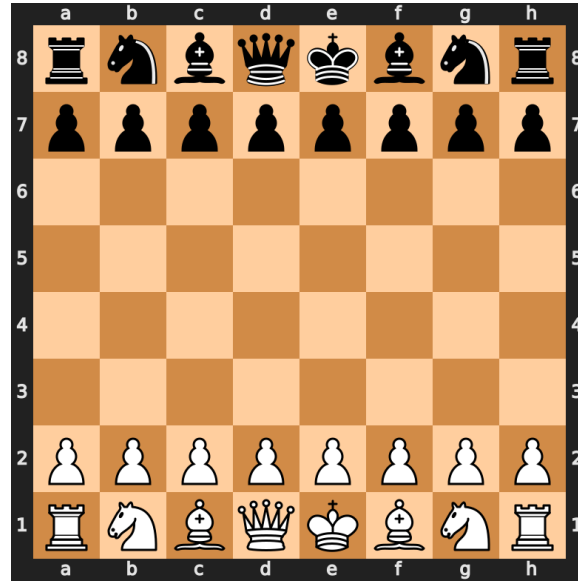
Chess move notation in algebraic form is given below

**Chessboard Coordinates** : The board is an  $8 \times 8$  grid

1. Files/Columns are labeled **a** to **h** from left to right from White's perspective
2. Ranks/Rows are labeled **1** to **8** from bottom to top from White's perspective
3. The board description is as given below pictorially.

**Piece Abbreviations** : Following are the important abbreviations

1. K: King
2. Q: Queen
3. R: Rook



4. B: Bishop
5. N: Knight (to avoid confusion with King)
6. Pawns are not given a letter; just the destination square is recorded.

**Move Notation** : The general move notation is given as described below

1. Each move is written as a combination of the piece moved and the destination square
2. e4: Pawn moves to e4.
3. Nf3: Knight moves to f3.

**Special Symbol - Captures** : Representation

1. A capture is denoted by an x.
2. Nxf3 means a Knight captures a piece on f3.
3. For pawns, the column it comes from is included before the x.
4. exd5 means a pawn from the e-column captures a piece on d5.

**Special Symbol - Check** : Representation

1. A check is denoted by +.
2. Qh5+ means the Queen moves to h5 and puts the King in check.

**Special Symbol - Checkmate** : Representation

1. A checkmate is denoted by #.
2. Qh5#

### **Special Symbol - Castling** : Representation

1. 0-0: Kingside castling (short).
2. 0-0-0: Queenside castling (long).

### **Special Symbol - Pawn Promotion** : Representation

1. When a pawn reaches the last rank, it is promoted. The promotion piece is written after the move.
2. e8=Q means a pawn moves to e8 and becomes a Queen

### **Special Symbol - En Passant** : Representation

1. Denoted as a normal capture, but it's a special pawn move.
2. exd6 e.p.

### **Special Symbol - Ambiguity** : Resolution

1. If two pieces of the same type can move to the same square, the file or rank of the moving piece is included to clarify.
2. Example: If both Knights can move to f3:
  - Nbd2 (Knight from the b-column moves to d2).
  - N1f3 (Knight from row 1 moves to f3).

### **Result** : Representation

1. The game result is written at the end:
2. 1 - 0: White wins
3. 0 - 1: Black wins
4.  $\frac{1}{2} - \frac{1}{2}$ : Draw

### **Examples** Some examples

1. e4 e5: Meaning
  - White starts by moving the pawn to e4.
  - Black replies with the pawn to e5
2. Nf3 Nc6: Meaning
  - White moves the Knight to f3.
  - Black replies with the pawn to e5

### **Question 1:** (84 points)

Basic SQL, Chapter 3, text book **Database System Concepts**, Abraham Silberschatz, Henry F. Korth & S. Sudarshan. Given the above description about chess notation, perform the following tasks.

**Task 01** (1 mark) Create a database named `week05`. Create the following tables within this database.

**Task 02** (9 marks) Create a table with the following schema

1 <sup>st</sup> column	Move Number	<code>int</code> data type
2 <sup>nd</sup> column	Player	fixed length <code>char</code> of size 10
3 <sup>rd</sup> column	Piece	fixed length <code>char</code> of size 10
4 <sup>th</sup> column	Start Square	fixed length <code>char</code> of size 2
5 <sup>th</sup> column	End Square	fixed length <code>char</code> of size 2
6 <sup>th</sup> column	Is Capture	<code>tinyint</code> data type
7 <sup>th</sup> column	Is Castling	<code>tinyint</code> data type
8 <sup>th</sup> column	Is Check	<code>tinyint</code> data type
9 <sup>th</sup> column	Is Check Mate	<code>tinyint</code> data type

Player take values from the set {White, Black}

Piece take values from the set {Rook, Knight, Bishop, Queen, King, Pawn }

Is Capture, Is Castling, Is Check and Is Check Mate take binary values from the set { Yes, No }

Start Square is the square notation explained above

End Square is the square notation explained above

**Task 03** (20 marks) Write a C program to convert the given input database file `gukesh-makan.csv` into the format described in **Task 02** and obtain a series of `INSERT` statements to insert into the above table. Store the output into a file named `gukesh-makan-01.sql`. At the SQL prompt, run the command `source insert.moves.sql`

**Task 04** (42 marks) Write SQL statements for the following queries. Each query carry one mark.

1. Retrieve all White's Rook moves
2. Retrieve all White's Knight moves
3. Retrieve all White's Bishop moves
4. Retrieve all White's Queen moves
5. Retrieve all White's King moves
6. Retrieve all Black's Rook moves
7. Retrieve all Black's Knight moves
8. Retrieve all Black's Bishop moves
9. Retrieve all Black's Queen moves
10. Retrieve all Black's King moves
11. Retrieve how many Black pieces were killed by White?
12. Retrieve how many White pieces were killed by Black?

13. Retrieve how many Black pieces were killed by White Rook?
14. Retrieve how many Black pieces were killed by White Knight?
15. Retrieve how many Black pieces were killed by White Bishop?
16. Retrieve how many Black pieces were killed by White Queen?
17. Retrieve how many Black pieces were killed by White King?
  
18. Retrieve how many White pieces were killed by Black Rook?
19. Retrieve how many White pieces were killed by Black Knight?
20. Retrieve how many White pieces were killed by Black Bishop?
21. Retrieve how many White pieces were killed by Black Queen?
22. Retrieve how many White pieces were killed by Black King?
  
23. Retrieve records in which White Rook made the Check
24. Retrieve records in which White Knight made the Check
25. Retrieve records in which White Bishop made the Check
26. Retrieve records in which White Queen made the Check
  
27. Retrieve records in which Black Rook made the Check
28. Retrieve records in which Black Knight made the Check
29. Retrieve records in which Black Bishop made the Check
30. Retrieve records in which Black Queen made the Check
  
31. Retrieve records in which White's performed King side castling
32. Retrieve records in which White's performed Queen side castling
  
33. Retrieve records in which Black's performed King side castling
34. Retrieve records in which Black's performed Queen side castling
  
35. Retrieve records in which White pawn is promoted to Queen
36. Retrieve records in which White pawn is promoted to Rook
37. Retrieve records in which White pawn is promoted to Knight
38. Retrieve records in which White pawn is promoted to Bishop
  
39. Retrieve records in which Black pawn is promoted to Queen
40. Retrieve records in which Black pawn is promoted to Rook
41. Retrieve records in which Black pawn is promoted to Knight
42. Retrieve records in which Black pawn is promoted to Bishop

**Task 05** (12 marks) Write SQL statements for the following queries. Each query carry three marks.

1. List all moves where the starting square is a dark square (even file and rank).
2. Retrieve moves where the ending square is in the center of the board (d4, e4, d5, e5).
3. Find all unique squares (starting or ending) involved in any move
4. Identify squares that were starting points but never ending points.