All questions

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**1. Basic Database Concepts**

1. What is a Database?

2. What is a DBMS?

3. What are the functions of DBMS?

4. Difference between DBMS and RDBMS?

5. What is SQL?

6. Difference between SQL and NoSQL?

7. What is a primary key?

8. What is a foreign key?

9. What is a unique key?

10. Difference between unique key and primary key?

11. What is a composite key?

12. What is a super key?

13. What is a candidate key?

14. What is a surrogate key?

15. What is a schema?

16. What is a view?

17. What is metadata?

18. What is a domain constraint?

19. What are constraints in SQL?

20. What is a table?

21. What is a tuple?

22. What is an attribute?

23. Difference between DELETE, TRUNCATE, and DROP?

24. Difference between WHERE and HAVING?

25. Difference between IN and EXISTS?

26. Difference between UNION and UNION ALL?

27. What is a subquery?

28. What is a correlated subquery?

29. Difference between JOIN and UNION?

30. What are the types of JOINs in SQL?

31. What is a self-join?

32. What is a cross join?

33. What is a natural join?

34. What is a Cartesian product?

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2. **SQL Command Categories**

35. What are DDL, DML, DCL, and TCL?

36. Difference between DML and DDL?

37. Examples of DDL commands?

38. Examples of DML commands?

39. What is COMMIT and ROLLBACK?

40. What is SAVEPOINT?

41. What is GRANT and REVOKE?

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**3. Normalization**

42. What is normalization?

43. Why is normalization important?

44. Types of normal forms (1NF, 2NF, 3NF, BCNF)?

45. 1NF with example?

46. 2NF with example?

47. 3NF with example?

48. What is BCNF?

49. What is functional dependency?

50. What is transitive dependency?

51. What is partial dependency?

52. What is denormalization?

53. Difference between normalization and denormalization?

54. Advantages of normalization?

55. Disadvantages of normalization?

56. What is redundancy?

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**4. Indexing & Query Performance**

57. What is an index?

58. How do indexes improve performance?

59. What is a clustered index?

60. What is a non-clustered index?

61. Difference between clustered and non-clustered index?

62. What is a covering index?

63. What are composite indexes?

64. What is index cardinality?

65. When to avoid indexes?

66. What is query optimization?

67. What is a query plan / execution plan?

68. What is EXPLAIN / EXPLAIN ANALYZE?

69. How to identify slow queries?

70. How to optimize JOIN queries?

71. How does caching help performance?

72. How to avoid full table scans?

73. Difference between sequential scan and index scan?

74. What is index selectivity?

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**5. Data Integrity & Constraints**

75. What is data integrity?

76. What is referential integrity?

77. What are NOT NULL, UNIQUE, CHECK, DEFAULT constraints?

78. What is a default constraint?

79. What is a check constraint?

80. What is ON DELETE CASCADE?

81. What is ON UPDATE CASCADE?

82. What is constraint violation?

83. How do constraints help maintain quality?

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**6. Transactions & ACID**

84. What is a database transaction?

85. What are ACID properties?

86. What is atomicity?

87. What is consistency?

88. What is isolation?

89. What is durability?

90. What is isolation level?

91. Types of isolation levels?

92. What is locking?

93. Difference: optimistic vs pessimistic locking?

94. What is a deadlock?

95. How to prevent deadlocks?

96. Difference: shared lock vs exclusive lock?

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**7. Stored Procedures, Triggers & Functions**

97. What is a stored procedure?

98. What is a function in SQL?

99. Difference between procedure and function?

100. What are triggers?

101. Types of triggers (BEFORE, AFTER)?

102. Use cases of triggers?

103. What is a cursor?

104. Difference: implicit vs explicit cursor?

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**8. Advanced / Real-World Database Design**

105. How to design a multi-tenant system?

106. How to design an e-commerce DB?

107. How to build an order management system?

108. How to store audit trails / logs?

109. What is schema migration?

110. What is data migration?

111. How to handle large datasets?

112. What is horizontal scaling?

113. What is vertical scaling?

114. What is replication?

115. What is master-slave replication?

116. What is sharding?

117. What is partitioning?

118. What is a materialized view?

119. What is a trigger log table?

120. How to model many-to-many relationships?

121. How to handle optional relationships in database schema?

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**9. NoSQL / MongoDB / Redis**

122. What is NoSQL?

123. Types of NoSQL (document, key-value, column, graph)?

124. When to use NoSQL over SQL?

125. What is MongoDB?

126. What is a document in MongoDB?

127. What is a collection?

128. What is ObjectId?

129. What is the Aggregation Pipeline?

130. What is MapReduce?

131. What is indexing in MongoDB?

132. What is a TTL index?

133. What is a capped collection?

134. Embedded vs Referenced documents?

135. How to perform joins in MongoDB ($lookup)?

136. What is Redis?

137. Use cases of Redis?

138. Difference: Redis vs MongoDB?

139. What is cache invalidation?

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**10. Security, Compliance & Backup**

140. How to secure sensitive data in DB?

141. What is SQL Injection?

142. How to prevent SQL injection?

143. What is role-based access control (RBAC)?

144. What is encryption in DBMS?

145. What is hashing?

146. What is GDPR?

147. What is data anonymization?

148. What is data masking?

149. What is backup and restore?

150. What is point-in-time recovery?

151. Hot vs Warm vs Cold backups?

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**11. OLTP, OLAP, and Data Warehousing**

152. What is OLTP?

153. What is OLAP?

154. Difference between OLTP and OLAP?

155. What is a data warehouse?

156. What is ETL?

157. Difference: ETL vs ELT?

158. What is a fact table?

159. What is a dimension table?

160. What is a star schema?

161. What is a snowflake schema?

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**12. Scenario-Based / Problem Solving**

162. A report is slow — how to fix it?

163. 10M rows in product table — how to search faster?

164. How to implement soft delete?

165. How to permanently delete data safely?

166. How to rollback accidental DELETE?

167. How to track changes in DB?

168. How to audit updates/deletes in sensitive data?

169. How to reduce DB storage size?

170. How to store product variants (size/color)?

171. How to build order system for multi-vendor marketplace?

172. You’ve been told to “speed up the app” — where do you start?

173. What tools or metrics do you use to measure database performance?

174. How to design a scalable DB for dynamic product attributes?