Mobile Operating Systems

Lesson 01

Operating System

Computations

- Require data
- Better to organise this data in a *database*
- Database enables raising queries, data transactions, and the retrieval of the required section of data during a computation

Database

- A collection of systematically stored records or information
- Is not just arbitrarily stored data without any logic
- Stores data in a particular logical manner, for example, as lookup tables

Lookup table

- A database which stores information in tabular form
- Table structure—the first column a reference for looking into the data
- Subsequent column or columns contain the data
- The reference—key to the data-values

Tags based database

- Another logical structure
- A tag is also the key to the data-values
- For example, "*contact*: 1 John, 2 Lucy." and "*address*: 1 ABC Street, 2 DEF Street."
- *contact* and *address*– tags in the database

Business (transactions) between the application software and database

- Computational actions– connecting to a database
- Using the database for querying for a record
- Deleting a specific set of records
- Modifications of records
- insertions into the records and
- Appending of the records

Transaction command

- Command which is sent for retrieving the data from the database, embodies the logic used for obtaining (and storing) the data

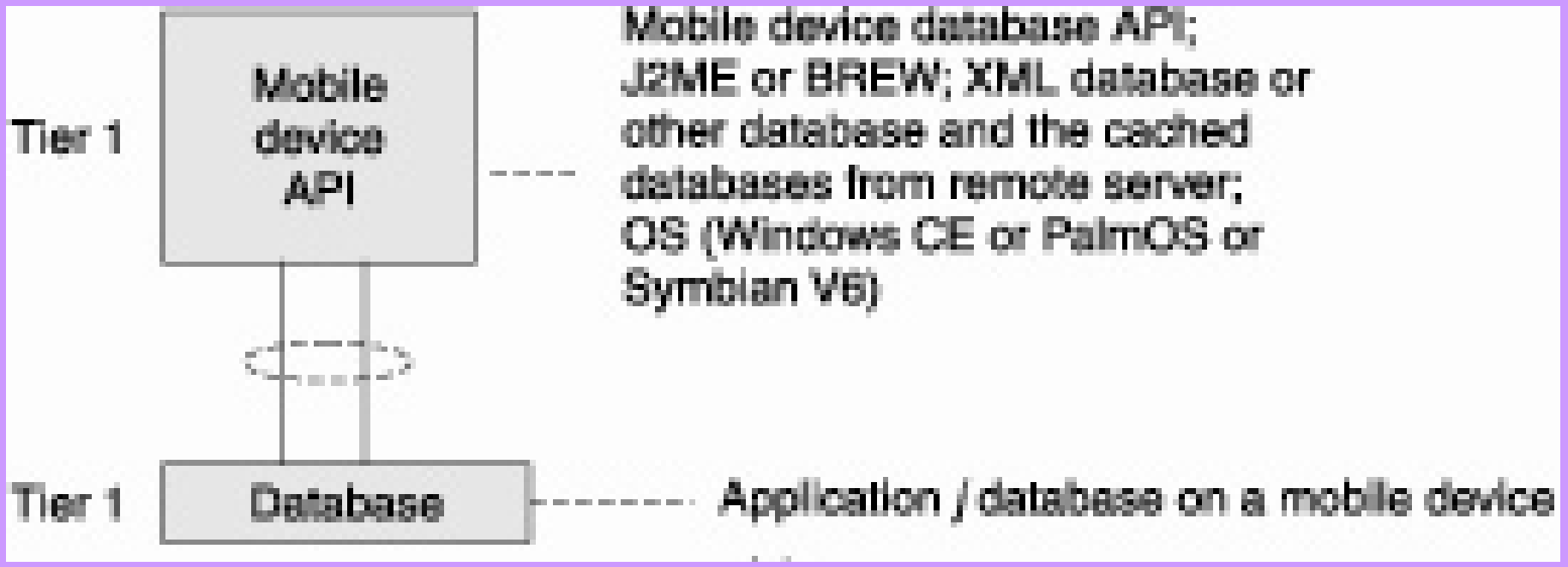
Data stored in databases

- Follows a logic
- Business logic indicates the logical way in which transactions (business) carried out
- Between two ends, for example, between database-client (application) and database-server or between an API and a database

API (application program interface

- A section of a program used to run an application (software)
- API may run instructions to retrieve a queried record from a database
- The API may also issue outputs or queries and commands to another program and receive the inputs from another program during a program-run

API at mobile device sending queries and retrieving data from local database



Transactions involving databases

- Establishing connection between API and database
- Updating data records by inserting, adding, replacing, or deleting
- Querying for records
- Terminating the connection between the API and the database

Implicit Business Logic

- 'Business logic' indicates the logical manner, flow, or pattern, in which business (or transactions) may be carried out with a database
- Implicit business logic– The structure and components of the database itself define, which is used in retrieving (or modifying) data from the database

Implicit Business Logic

- The logic of transactions (business logic) implicit when it comes from within the database
- No external definition required for the business logic to function

Example of Implicit Business Logic

- Telephone Directory in which the first word of each line is structured alphabetically

The telephone directory

- Names and telephone numbers arranged alphabetically shows implicit business logic
- Names and telephone numbers structured in rows with each row having a name and the corresponding address and telephone number

Search directory in an XML database

- Arranged alphabetically
- Database designed using XML uses a tag as a key
- The key enables business (transaction for retrieving, deleting, inserting, or modifying data)

Search directory in an XML database

- <search>
- <Allnames first_character = “R”>
- <name_record>
- Raj Kamal
- <address> ABC Street, …. </address>
- <telnumber> 9876543210 </telnumber>
- </name_record>

Search directory in an XML database

- </Allnames>
- <Allnames first_character = “S”>
- .
- .
- </search>

Explicit business logic

- Stored queries and procedures define the logic
- A transaction (business) between the API and the database uses an explicitly defined query

Example of Explicit business logic

- If Structure = most recently added entry list Content_Type = English English_Records, flight origin = Frankfurt, airline = Lufthansa, present time = 0800 hrs and status = Not arrived then Get_Records

Example of Explicit business logic

- Another query for business can be
- If flight origin = Frankfurt, airline = Lufthansa, present time = 0800 hrs and status = arrived then Delete_Records
- English_Records– a section of the database having English contents
- Get_Records and Delete_Records – two procedures that carry the transaction**s**

Connectivity Protocol

- An API that has predefined methods to handle the various data access functions
- Defines ways to connect to and access a database and methods for sending queries and updating or retrieving database records
- Connects a client or server to the database

Connectivity Protocol

- Describes the set of permitted commands, transaction methods, and the order in which commands are interchanged between the API and the database at the server or the client

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Connectivity Protocols

- Using the connectivity protocol API, a program issues commands
- Access a database and query in order to select and retrieve queried record(s) from the database

Examples of connectivity protocols

- Java database connectivity (JDBC)
- Open database connectivity (ODBC)
- Simple object access protocol (SOAP)
- Connect the server to the database

Relational Databases

- Defined as a database structured in accordance with the relational model
- The relational model of data organization helps the database designer to create a consistent and logical representation of information

The relational model

- Follows a relational logic which means that it is assumed that all data can be represented as *n*-ary (binary means *n* = 2, tertiary means n = 3,...) relations
- An *n*-ary relation is a subset of the Cartesian products of *n*-sets

Relational database

- Entails that it is always possible to mathematically model the relations between the data records and get the answers to the relational equations for the queries
- The answers are as in two-valued predicate logic

Two-valued predicate logic

- Means that there are only two possible results on evaluation, for each proposition—*true* or *false* and no third result, for example, ‘null’ or ‘unknown’, is possible

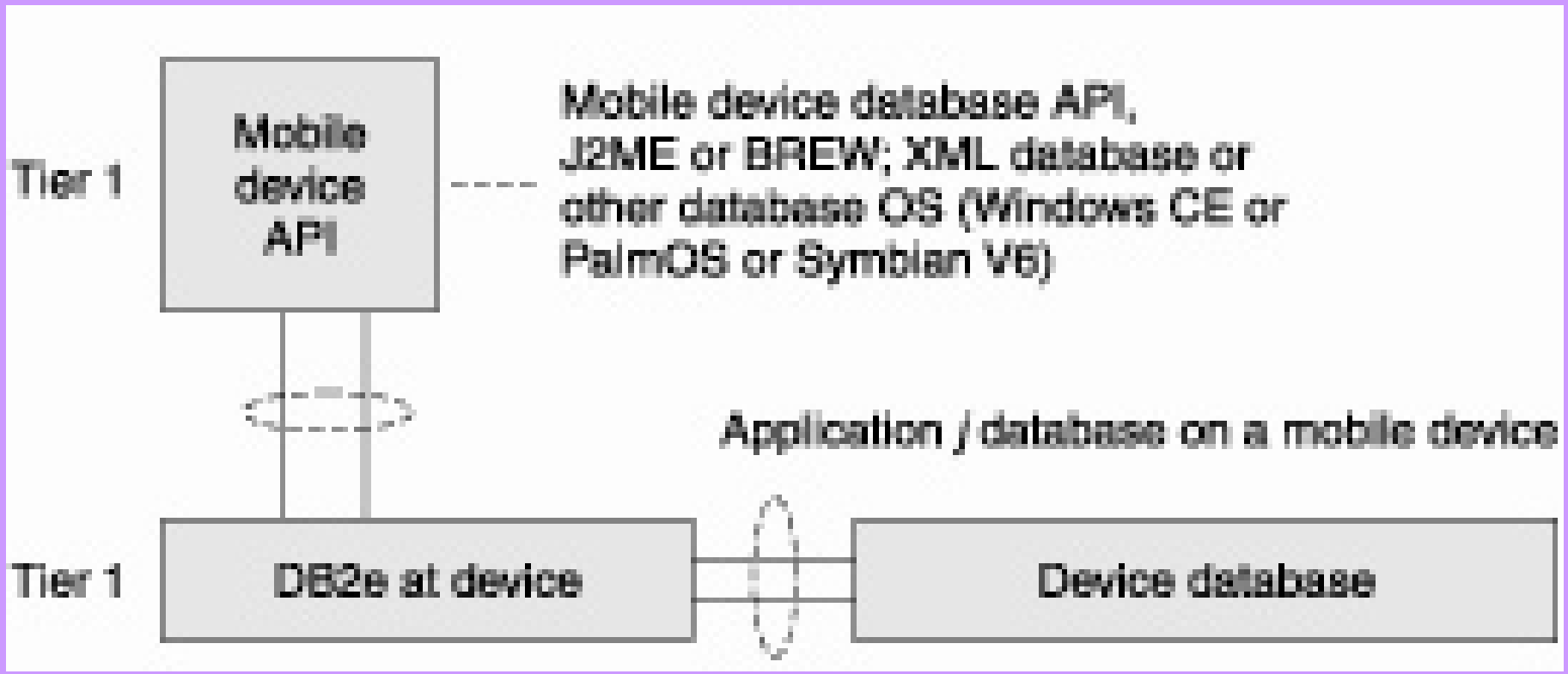
IBM DB2 Everyplace (DB2e)

- A relational database engine
- Needs a memory of about 100 kB
- Designed to reside at the device
- Supports databases of sizes up to 120 MB
- An enterprise server employing DB2e delivers and synchronizes the local copies of data contents at mobile devices

DB2e based Synchronization

- DB2e synchronizes with DB2 databases at the synchronization, application, or enterprise server
- Means that if a data record is modified at the server then the copy of that record at the client device also changes accordingly

API at mobile device retrieving data from database using DB2e



Summary

- Database a collection of systematically stored records or information
- Business logic' indicates the logical way in which transactions (business) carried out between two ends
- XML database
- Implicit Business Logic
- Explicit business logic for Stored queries and procedures …

… Summary

- Transactions involving databases are—(a) establishing connection (b) updating data records by inserting, adding, replacing, or deleting, (c) querying and (d) terminating the connection
- Connectivity protocol
- Relational databases

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… Summary

- IBM DB2e EveryPlace for retrieving database records and querying from DB2e server

End of Lesson 01

Operating System