Lesson 03
Domain dependent Specific Rules and Conflict resolution Strategies
1. Data synchronization in domain-specific platforms and data formats

• Data synchronization between data-generating domain and destined domain, both having different platform and data formats
Examples of synchronization in domain-specific platforms and data formats

- A copy of database record at the device structured text or XML format and the device OS platform Symbian
- The record synchronized with the database record at the server where it is in DB2 or Oracle database format and the OS is Windows
2. Domain-specific data-property-dependent synchronization

- Data synchronization between one domain with one property of data and another domain having different property
Examples of Domain-specific data-property-dependent synchronization

- A data record at a device having an ID specified by a byte synchronizes with the record, which has an ID specified by 16-bit word at the server.
- A device using 8-bit ASCII characters for an ID while the server using 16-bit Unicode characters.
3. Synchronization up to the last successful act of synchronization

- A domain-specific rule that data record considered to be synchronized if it was updated at the last connection
Example of Synchronization up to the last successful act

- A phonebook records of missed calls, dialled numbers, and received calls
- Data record at the device synchronized with the record in the phonebook
- If it updated at the last connection, then it eventually updates again on the next connection
4. Memory-infrastructure-dependent based synchronization at the domains

- A domain-specific rule that data records synchronized up to the allotted memory
Example of Memory-infrastructure-dependent based synchronization

- A remote server maintaining full address book with allotted memory of 8 MB and a device allocated 128 kB for the address book
- Only a part of e-mail database, only 100 new email addresses synchronizes and saves in the device PIM (personal information manager)
5. Synchronization with temporal properties of data

- Domain-specific rule that data records synchronized with data generated at source within specific time interval and at the time specified at the domain
Example of Synchronization with temporal properties of data

- The flight time table data set of device synchronized every week and weather report once every day
- At the device weather report updated and synchronized up to the last day
- Eventually updates on a day if available at the server
Synchronization with temporal properties of data

- May be periods of inconsistency when temporal properties of data being used for synchronization
- However, mobile applications remain unaffected if there are no temporal conflicts and unaccountable discrepancies
Conflict in synchronization

- Arises when a data copy changed at one end but not simultaneously modified at other ends.
- Therefore, the same data item at two ends, $P$ and $Q$, in conflict during computation in the time interval between $t_1$ and $t_2$, where $t_1$ and $t_2$—the instants when $P$ and $Q$ get the modified data copy.
Synchronization and Conflict Resolution Strategies

- A conflict resolution strategy adopted in such cases to resolve conflicts
- The strategy specifies the rules that need to be applied for conflict resolution
1. Priority-based resolution rule

- Data-server can be specified as dominant higher priority entity for conflict resolution of synchronized data records
Example of Priority-based resolution rule

- Mobile-service-provider server S having a list of missed, dialled, and received calls for the device D
- D has a synchronised list of missed, dialled, and received calls
- When the list at D in conflict with the list at S, priority-based resolution rule specifies that the server priority is higher
2. Time-based resolution rule

- Data node P specified as dominant entity when P always receives copies first from the server S
Time-based resolution rule — Example

- S having the emails disseminated to the device D at an instant $t_1$
- D connects to a personal area computer (PC) to which the device always synchronizes the mails at a later instant $t_2$
- Time-based resolution rule— D dominant because it receives the mails earlier than the PC
3. Information-based resolution rule

- Data node can be specified as dominant entity when information specific to it is synchronized with other nodes
Example of Information-based resolution rule

- Server S having the device configuration record disseminated from the device D
- Information-based resolution rule specifies that since the information is for the device D hence D is dominant node
- For device-specific information, the device data accepted rather than the server data
4. Time-stamp-based resolution rule

Device-specific storage Format

- Time-stamp-based resolution rule necessitates that a time-stamp must be used while sending a data copy
- The copy found to be latest resolves the conflict
Example of Time stamping rule for conflict resolution

- Server S having the flight information which it always disseminates at regular intervals with a time stamp over it to the device D and as well as to a PC.
- Time-stamp-based resolution rule specifies that the node with flight information with latest time stamp dominant.
5. User-interaction-based resolution rule

- An API at a device allows a user to interact with the device.
- Interaction resolves the conflict arising out of the duplicate or multiple entries.
- The duplicate data entries permitted at the node when a receiver API later on resolves the conflict after interaction with user.
Example of User-interaction-based resolution rule

- Two phone number entries found for same name and address, the device prompts user to resolve the conflict
- User resolves the conflict by opting for one of it
Summary

- Domain specific rules
- Data formats and platforms based synchronization
- Data property dependent synchronization
- Last successful action based synchronization

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- Memory infrastructure dependent synchronization
- Temporal properties based synchronization
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- Rules for resolution of conflict in synchronized data
  - Priority Based
  - Time Based
  - Information Based
  - Time-stamp Based
  - User interaction Based
End of Lesson 03
Domain dependent Specific Rules and Conflict resolution Strategies