The Session Layer

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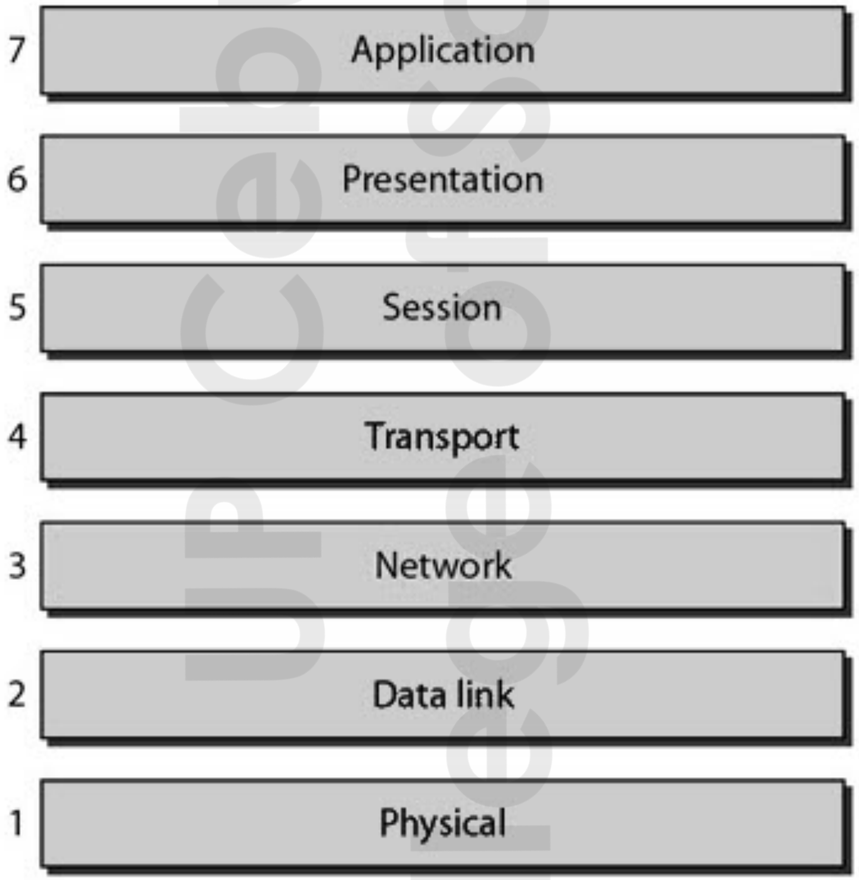
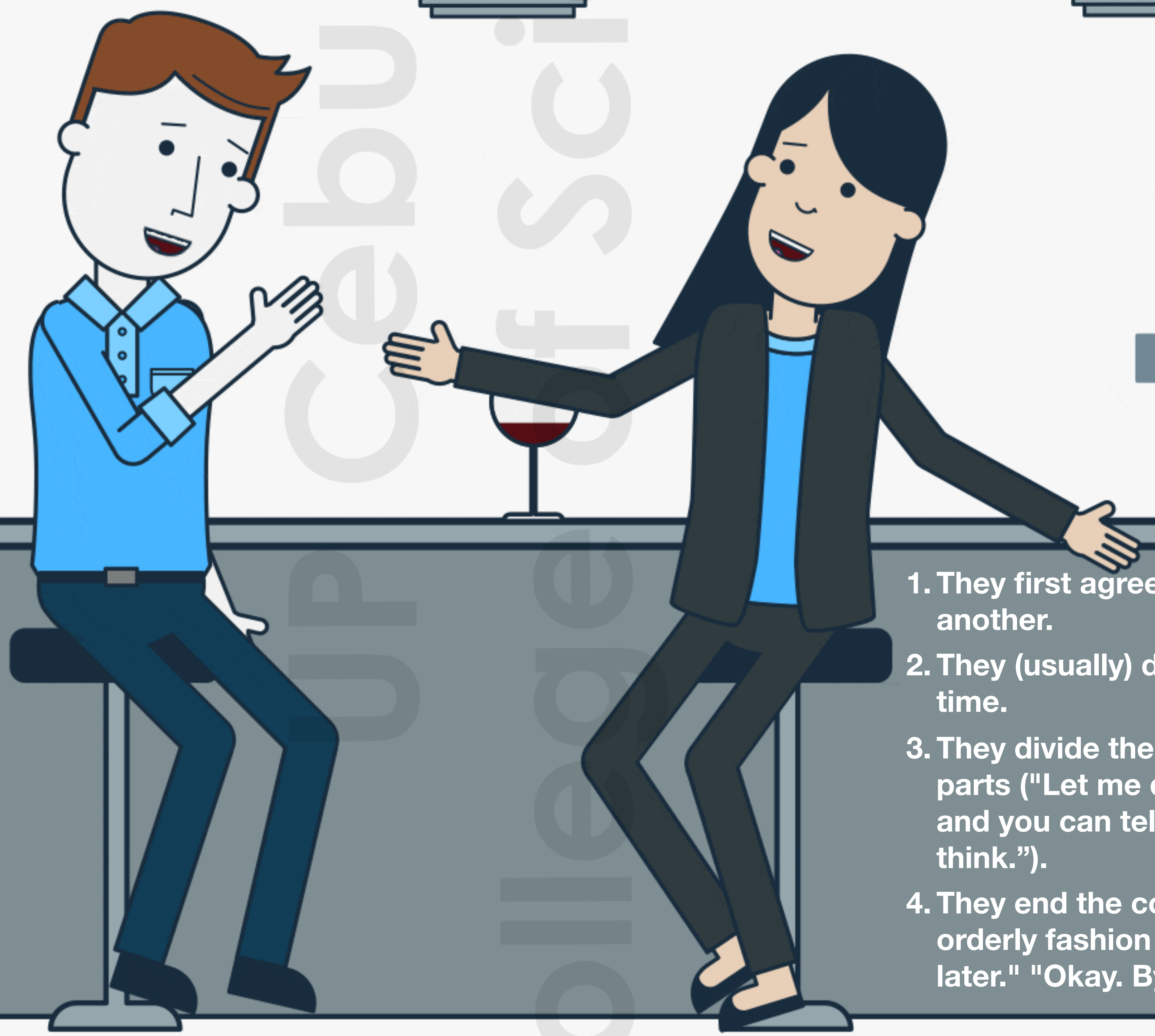


A session is analogous to a conversation between humans.



Certain conventions in conversation allow for the orderly and complete transfer of information between the parties.

1. They first agree to talk to one another.
2. They (usually) don't talk at the same time.
3. They divide the conversation into parts ("Let me describe it to you, and you can tell me what you think.").
4. They end the conversation in an orderly fashion ("I'll talk to you later." "Okay. Bye.").

Session Layer

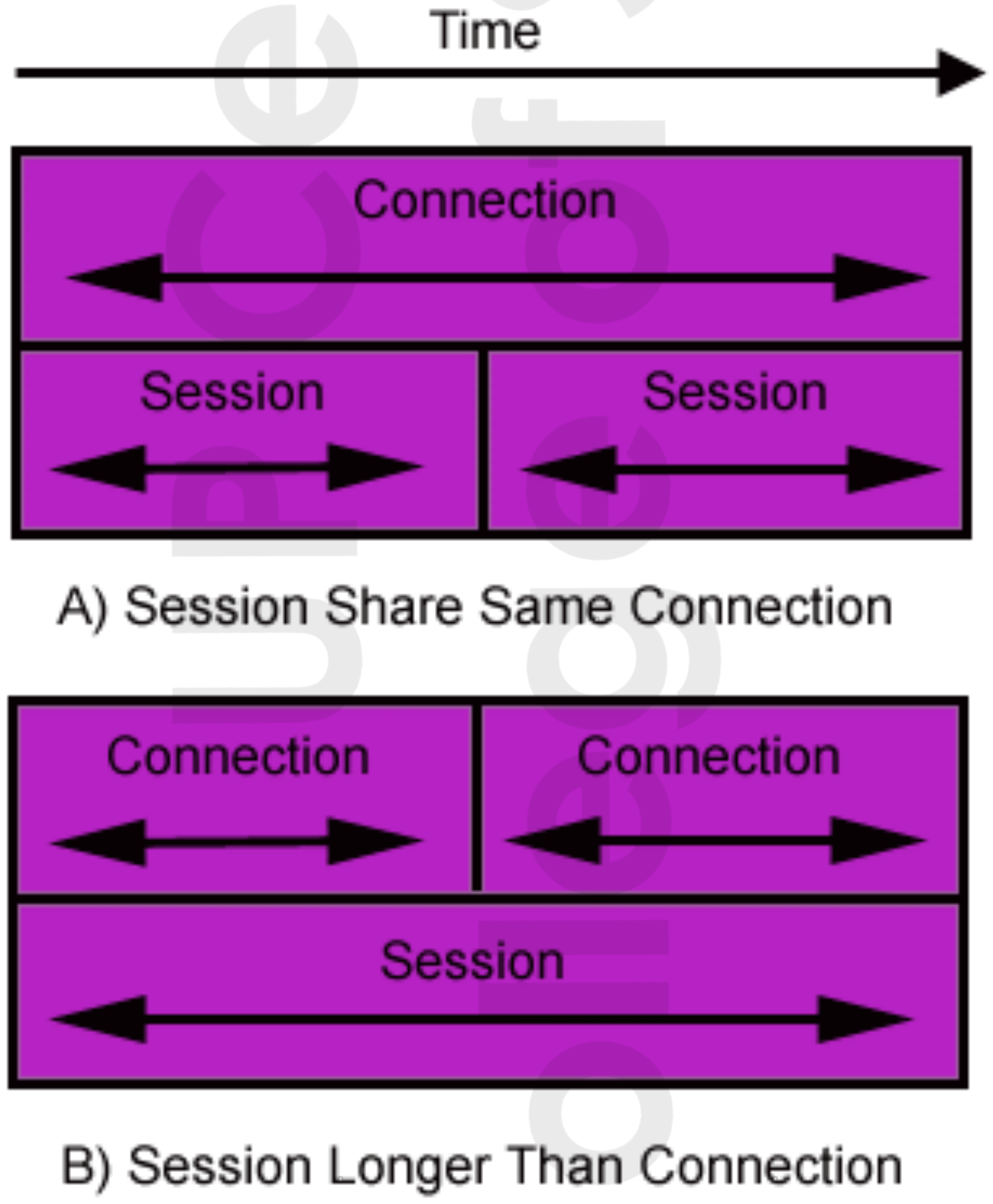
- So named with the notion of a session taking place between two entities.
- Example, an interactive user session would begin with the user logging on to the computer and end with the user logging off.
- A session is different from a connection established by the Transport Layer:
    - Session's longevity, and
    - Layer go beyond simply establishing a connection.
- The thinnest layer in the OSI model.
- Concerned with coordinating applications as they interact on different hosts.
- It establishes, manages and terminates sessions among applications.

Services Provided to Higher Layers to Conduct Session

- Establishing a session (separately from a connection).
- Conducting dialogs (prevent both parties from transmitting data at the same time).
- Managing activities (divide the session into parts).
- Ending the session gracefully (both ends agree to stop).

Session Management

- A session can be independent from a specific Transport Layer connection.
    - Several sessions can take place during a single connection.
    - A session can require several Transport Layer connections.



In comparison to a human conversation, Case B is equivalent to calling the other party back if the call is interrupted before you're finished talking. Case A amounts to passing the phone around in a family call.

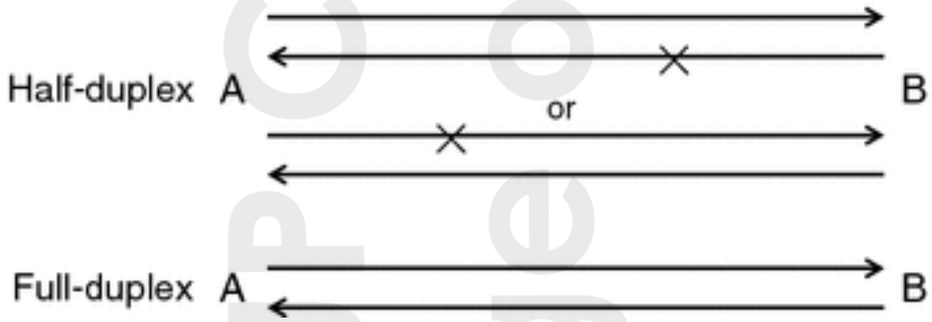
Any other example?

Orderly release of session…

- The lower layers support only an abrupt termination of the connection.
- The Session Layer takes care of gracefully ending dialogs between nodes.
- In a conversation, it's polite to make sure that the other party is finished talking before you hang up the phone.

Dialog Management

- Manages communication between two processes in either half-duplex mode or full-duplex mode.



In a system that supports half-duplex mode, what do you propose the Session Layer would do to manage communication?

In half-duplex...

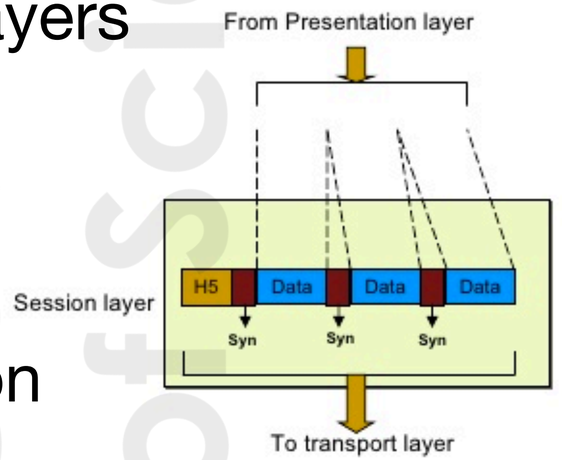
- Need to decide whose turn it is to transmit.
- Implemented through a data token.
- User with token can transmit.

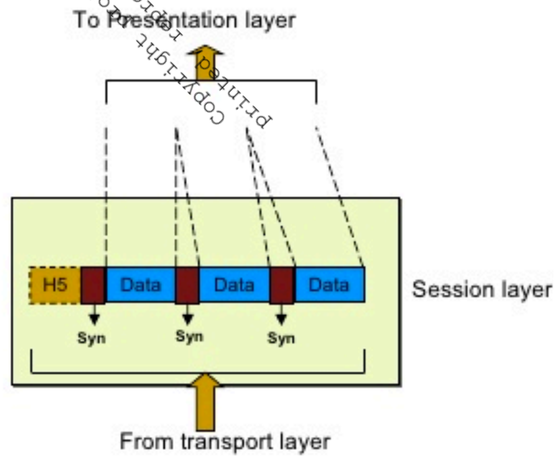
How about non-communication errors?

- Lower layers (Layer 1 to 4) deal with communication errors.
- How about non-communication errors?
    - Example: In a file transfer, transport layer might deliver data correctly but application layer might be unable to write the file because the file system is full.

Synchronization

- Deals with upper layer errors (Layers 6 - 7).
- How?
  - Layer creates certain checkpoints (synchronization points) while transmitting volumes of data in a sequence.
  - When problem happens in the middle of transmission, retransmission will take place from the point error occurred.





For example, if a system is sending a file of 2,000 pages, it is advisable to insert checkpoints after every 100 pages to ensure that each 100-page unit is received and acknowledged independently. In this case, if a crash happens during the transmission of page 523, the only pages that need to be resent after system recovery are pages 501 to 523. Pages previous to 501 need not be resent.

Another scenario…

- A bank transaction may consist of locking a record, updating a value, and then unlocking the record. If an application processed the first operation, but never received the remaining operations (due to client or network failures), the record could remain locked forever.

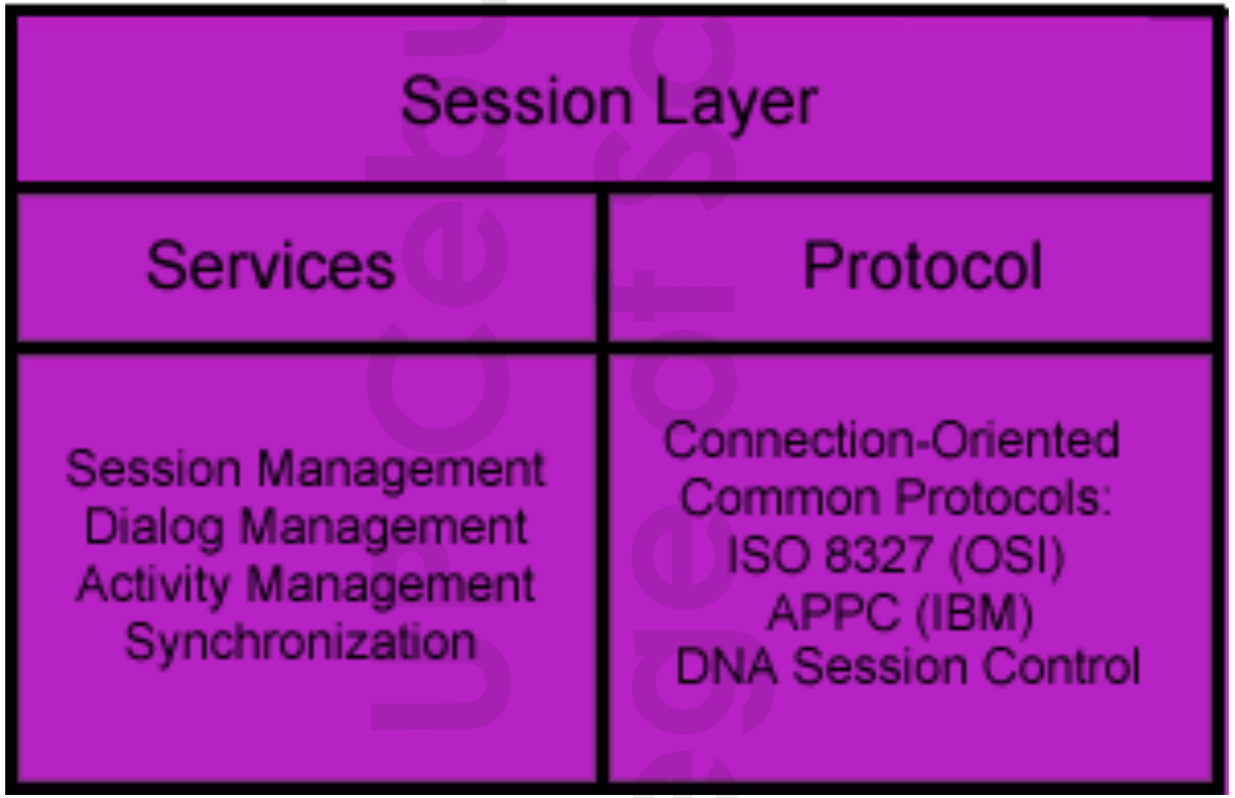
Activity Management

- Allows to delimit the data into logical units called activities.
- Usage of activities:
  - **Quarantining** - collecting all the messages of a multi-message exchange together before processing them.
  - **Multi-file transfer** - use activities to delimit files.

Common Protocols

- ISO 8327 - Defined for use by programs being written to conform to the OSI model.
- Advanced Program to Program Communication (APPC) facility of IBM's SNA.
- The session control protocol of Digital's Digital Network Architecture (DNA).

Summary



2nd Long Exam

- Date: Monday, November 19
- Time: 2:00PM - 4:00PM
- Room: 304
- Coverage: Data Link Layer, Network Layer, Transport Layer, Session Layer