Mobility, Portability, Replication and Clustering
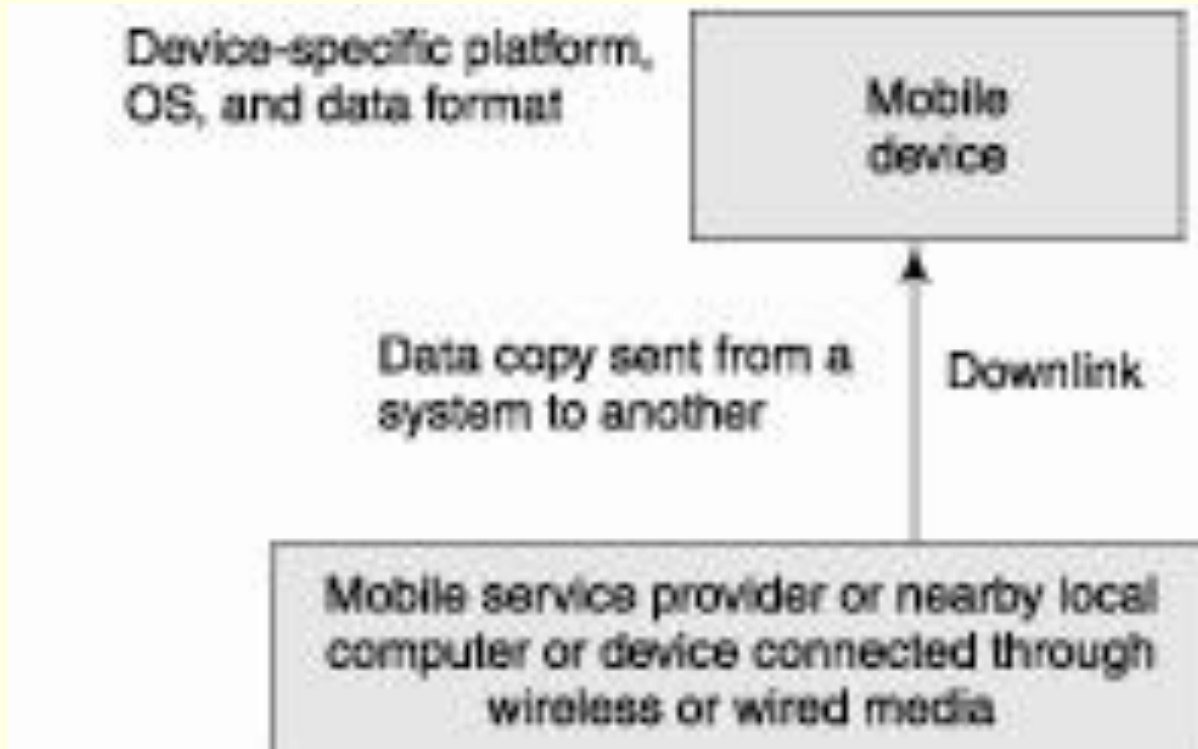
Lesson 02
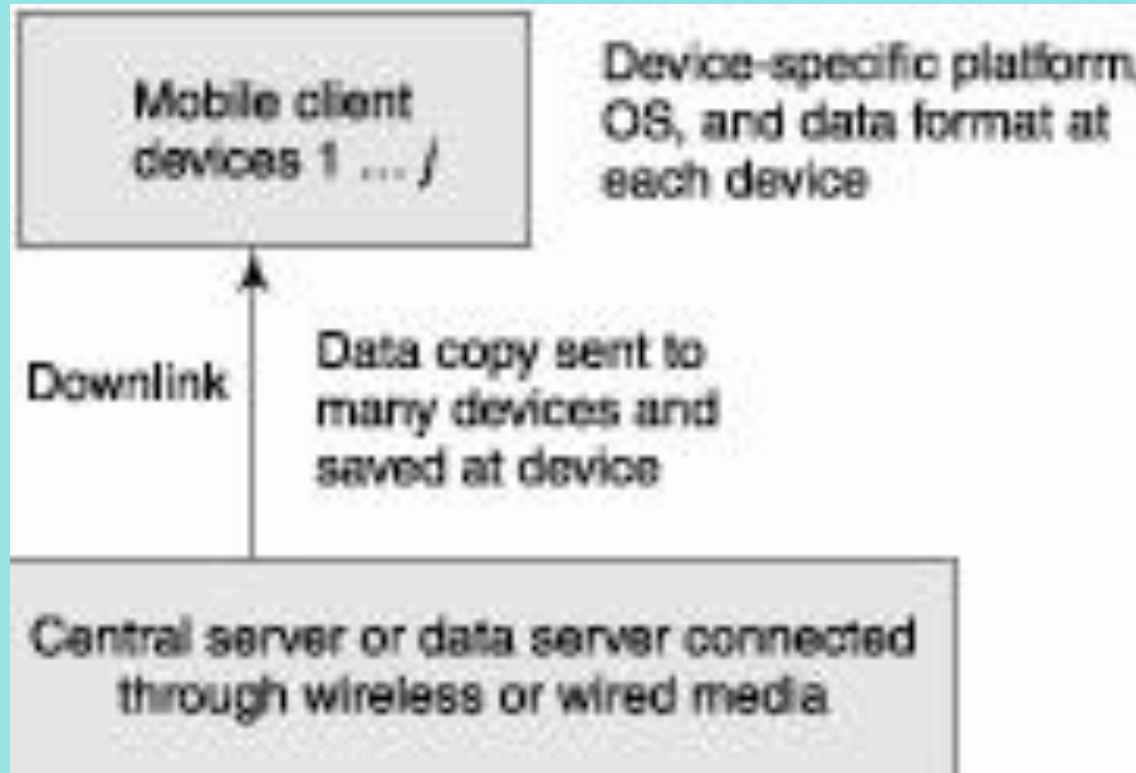
Data Replication Schemes

Data dissemination and replication at either remote or local location (s)

- Data replication─ copying of data at one place after copying from another (i.e., recopying)

- Copying from one to many others or from many to many others

- For example, videos of faculty lectures or music files get replicated at mobile phone

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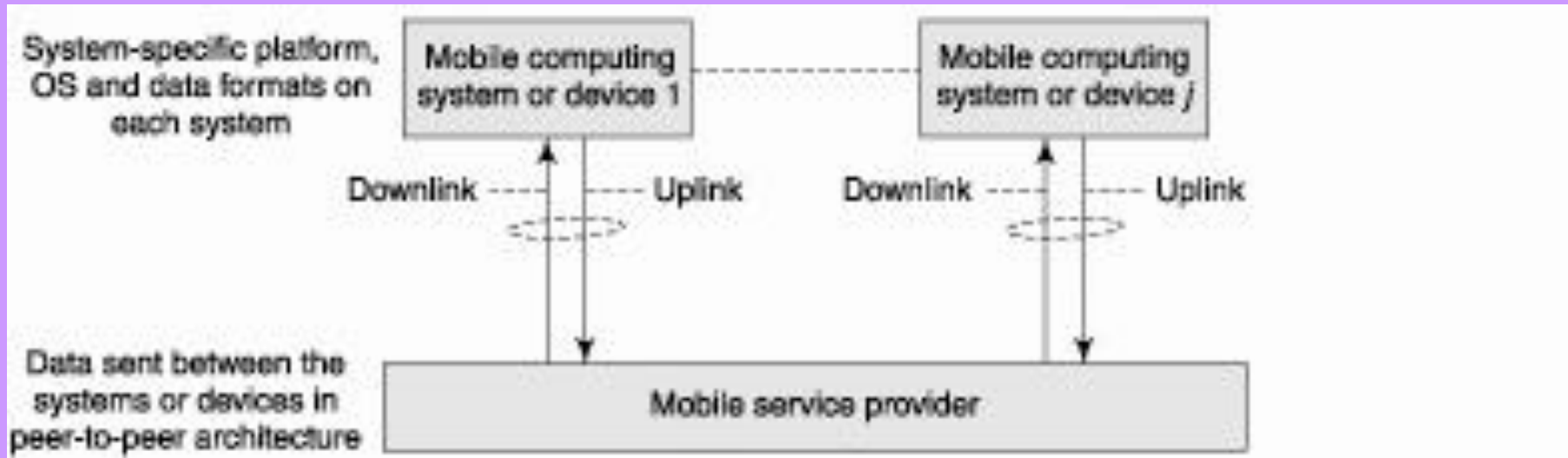# Data replication from data source and device

Device-specific platform, OS, and data format

Mobile device

Data copy sent from a system to another

Downlink

Mobile service provider or nearby local computer or device connected through wireless or wired media

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DATA REPLICATION FROM DATA SOURCE SERVER TO MANY CLIENTS (DEVICES)

Mobile client devices 1 ... *j*

Device-specific platform, OS, and data format at each device

Downlink — Data copy sent to many devices and saved at device

Central server or data server connected through wireless or wired media

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One to many synchronization

- Each system or device caches the data pushed from the server or sends a pull request to the central server and gets a response

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DATA REPLICATION AMONG SYSTEMS AND DEVICES IN PEER TO PEER ARCHITECTURE

System-specific platform, OS and data formats on each system

Mobile computing system or device 1

Mobile computing system or device j

Downlink ---- ---- Uplink

Downlink ---- ---- Uplink

Data sent between the systems or devices in peer-to-peer architecture

Mobile service provider

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Many-to-many synchronization

- Employs peer-to-peer architecture where each system is capable of sending pull requests and of pushing responses

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Full copy from a source

- Means that the full set of data records replicates according to certain domain-specific data format rules at the replicating devices or systems

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Full copy from a source

- A server having a set of 8 images with resolution 640 × 640 pixels

- In the domain of a mobile device, it can replicate and hoard with 160 × 160 pixels

- When all 8 images copied, though with the different resolution, then it is known as full copy replication

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Partial copying of data from the source

- A subset of the data set copied according to certain domain-specific rules at the devices or systems

- Assume that a server has a hourly data set of 24 temperature records with ± 0.1°C

- Partial copy replication In mobile device domain, assume that it replicates and hoards three hourly records with ± 1°C

Data Synchronization

- Data replication precedes data synchronization

- The synchronization refers to maintaining data consistency among the disseminated or distributed data

- Data consistency— if there is data modification at the server then that should reflect in the data with the device within a defined period

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Data Synchronization in Mobile computing systems

- Defined as the process of maintaining the availability of data generated from the source and maintaining consistency between the copies pushed from the data source and local cached or hoarded data at different computing systems without discrepancies or conflicts among the distributed data.

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Consistent copy of data

- A copy which may not be identical to the present data record at the data-generating source, but must satisfy all the required functions and domain-dependent specific rules

DOMAIN SPECIFIC RULES FOR CONSISTENCY

- In terms of resolution, precision, data format, and time interval permitted for replication

- A consistent copy should not be in conflict with the data at the data-generating source

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Data synchronization for accessing data from server

- Helps mobile users in accessing data and using it for computing on mobile devices

- When a device not connected to a source or server, the user may employ data that is not in conflict with the present state of data at the source

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Data synchronization enhancing device mobility

- When initiated at frequent intervals enhances device mobility

- Ensures that device applications use the latest updated data from the source, even when the device is disconnected

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Summary

- Data replication means copying from another

- Data replication as per domain specific rules

- Full copy synchronization

- Partial copy synchronization

- Consistent copy with no discrepancy

… Summary

- One to one Data synchronization

- One to many

- Many to many

- Synchronization at device from server

- Synchronization at server from device

- Delayed synchronization

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End of Lesson 02
Data Replication Schemes