



**Mobile Computing
(3C05)**

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Outline


- Introduction
- Current situation in mobile computing
- Problems
- Middleware current solutions
- New approaches
- GPS
- Paradigms for mobile computing
- Summary

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Introduction


Definition: The use of portable computer devices to connect to business computer networks by means of wireless connections. (Bitpipe)

- users carrying portable devices have access to data and information services regardless of their physical location or movement behavior.

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Location Based Services

- i.e. locating the 5 closest restaurants to you
- Accessed through a common wireless channel
- 2 ways of access:
 - on demand access- per query basis
 - broadcast access

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Problems


- Limited bandwidth
- Limited Battery Life
- Ability to locate users and direct them to the right server

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Existing Middleware

Object Oriented


- Such as CORBA, DCOM and Java RMI.
- IIOP (Internet Inter-ORB Protocol)- insures that the connection remains established transparently.
- RAPP, DOLEMEN- alternative methods for supporting CORBA in the wireless environment
- Mobile DCE- demonstrates that remote procedure calls could be utilized by mobile applications

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Existing Middleware

However!

All of these assume permanent connectivity!




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Existing Middleware

- Alternative way: event notification. Consumers subscribe they are interested in. Such as ELVIN, Siena and iBus.
- ELVIN has been modified to prevent clients that frequently disconnect from losing events.


BUT...



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Existing Middleware


They all require connection to the same proxy, which is not possible!



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
Existing Middleware

- Tuple space systems that act as a repository of data structures called tuples that process can concurrently access.
- Communication is de-coupled so that senders and receivers do not need to be available at the same time. (Lime, TSpace)



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New Approaches

- Awareness of the context in which the middleware is used

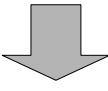


Mainly: User context



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User Context

- Location- varying accuracy
- Relative Location- such as proximity to printers
- Device Characteristics- processing power and input devices
- Physical Environment- such as noise level and bandwidth
- User Activity- driving a car or sitting in a lecture




FOCUS: Location Information


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New Approaches


- Interact directly with the underlying network OS to extract location
- BUT: do not cope with the coordinate system such as Global Positioning System (GPS)

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GPS

General location systems divide into:

- Providing highly accurate location estimates (order of centimeters) within a small area
- Or lower accuracy within a large area.

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GPS


- GPS provides a wide area coverage
- Uses low-orbit satellites and covers the entire earth.

Disadvantages:

- Coverage is limited
- Cannot penetrate through most buildings



Usability:

- Mostly in navigation systems
- Little use in other applications

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Paradigms for Mobile Computing

- Event Based Communication Model
- Proximity Based Communication



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Event Based

- Asynchronously connects the components that comprise and application in a distributed environment
- Supports: one-to-many, many-to-many communication patterns
- Allows one or more application components to react to a change in the state of another application
- Well suited for addressing the requirements of the mobile computing domain
- Avoids centralized control and long-lasting potentially expensive connections




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Proximity Based Communication

- Provides one-to-many or many-to-many communication patterns
- Allows a member of the group to send messages to all the members of that group
- Can be used by producers to propagate messages to the consumers
- Proximity groups allow mobile application components to join a proximity group and interact with its members



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Summary



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