CPET 565/CPET 499
Mobile Computing Systems
Lecture 8
Introduction to Mobile Middleware

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A Specialty Course for
Purdue University's M.S. in Technology Graduate Program
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Introduction Mobile Middleware

- What is Mobile Middleware
- Mobile Middleware for Enterprise
- Adaptation
- Agents
- Service Discovery

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Introduction Mobile Middleware

- What is Mobile Middleware
- Definition
  - "Middleware is software that supports mediation between other software components, fostering interoperability between those components across heterogeneous platforms and varying resource levels," – Fundamentals of Mobile and Pervasive Computing, by Adelstein, Gupta, Richard III, and Schwiebert, McGraw-Hill, 2005

Introduction Mobile Middleware –
What is Mobile Middleware

- Definition from www.bitpipe.com/tist/Mobile-Middleware.html
  - Mobile middleware allows for the implementation of distributed applications connecting mobile and enterprise applications over wireless networks
- Provide the "black box" technology that connects mobile devices on the front lines of the enterprise to the back-end applications running on corporate servers
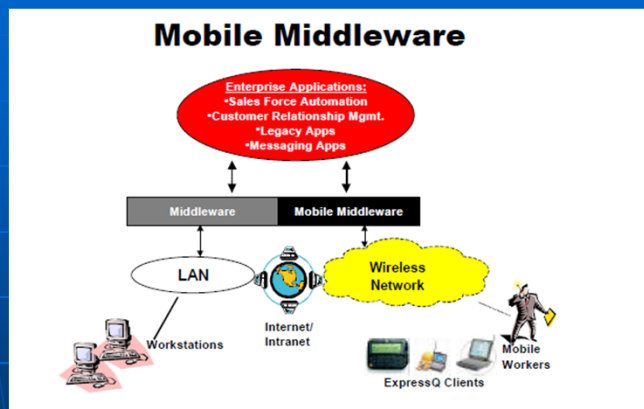
Mobile Middleware for Enterprise

- Mobile Client ⇔ Middleware ⇔ Servers
- Example Applications
  - Wireless email
  - Speech middleware
  - Firewall and mobile VPN (Virtual Private Network)
  - Network connectivity
  - Device management
  - Enterprise Access
    - CRM (Customer Relationship Management)
    - EAI (Enterprise Application Integration)
    - Enterprise data & information integration
    - Insurance Claim

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From "Mobile Middleware: The Next Frontier in Enterprise
Application Integration" by Tamara Kanoc

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Introduction to Mobile Middleware

- Challenges in developing and deploying a mobile application
  - Variety of wireless networks available
  - Variety of devices and mobile operating platforms
  - Need to communicate with roaming workers
  - Disparity between the LAN environment and the mobile environment
  - Difficulty in extending enterprise applications into the field
    - Security, scalability, reliability, easy integration, multiple network and platform support

Introduction Mobile Middleware

- Benefits of mobile middleware
  - Speeds up development and deployment cycles
  - Reduces risk by offering a field proven solution
  - Creates application once and run it over on any network or device
  - Provide efficient and reliable communications
  - Mobile middleware also need to provide
    - Guaranteed message delivery
    - Push messaging
    - Data security
    - roaming

Adaptation

- Tasks
  - Adapt behavior and expectations to conserve scare resources
  - Adjust quality of service (QoS) – guarantee performance
- How should adaptation be supported?
  - Monitor resources and adapt appropriatly

Agents

- Allowing programs to move autonomously about a network in order to access remote resources
  - Migrate to servers -> access data or computational resources -> migrate again -> return to home base
- Benefits
  - Disconnection is easily supported
  - Access to large amount of data to solve problem
  - Allow the functionality of servers to be expanded dynamically

Agents

- Examples of mobile codes
  - Browsers support Javascript, Java applets
  - Applets travel from server to client and are executed on the client
- Mobile agents
  - Move freely about a network
  - Make decisions on where to travel next
  - Perform computations and collect data
  - Communicate with other agents
  - Create new agents

Agents

- Mobile agents to search a set of databases
- Steps:
  - Dispatch agents to database servers or to machines close to the servers
  - Agents perform queries against the database servers
  - Agents sift the results
  - Agents return home and deliver the results
- Advantages
  - Save the bandwidth
  - Continuous network connectivity is not required
  - Executed on more powerful computers

Service Discovery

- Extend the client-server paradigm
- Discover needed service on-demand
- Bluetooth Service Discovery Protocol

Service Discovery

- Dynamically discovering and advertising services
- Extend the client-server paradigm
  - Dynamic discovery of services
  - Dynamic interaction between clients and services
- Discover needed service on-demand
  - E.g., wireless access point, printer
- Service Discovery Protocol

Open Source Mobile Middleware

- Mobile Application Support and Management Environment
  - Advising service
  - Discovery service
- Middleware Infrastructure
- Generic Mobile APIs
- Application Specific Mobile APIs

Open Source Mobile Middleware

- Jboss Enterprise Middleware, http://www.redhat.com/products/jbossenterprisemiddleware/
- Kurogo Mobile Platform, http://kurogo.org/home/
- Mobile SAAS Solutions (old ITAnyPlace), http://www.saasmob.com/
  - Smart App, Smart Inspection, Smart Work
- OpenMEAP, http://www.openmeap.com/faq/
  - Products, http://www.openmeap.com/products/

Mobile Middleware Platforms/Vendors

- SAP Enterprise Mobile, www.sap.com
- Mobile Enterprise Application Platform, Sybase – an SAP company, http://www.sybase.com/mobilize/strategic-mobility
- FMS Mobile Inventory and Supply Chain Management, http://www.hand.com/mobile_supply_chain
- InfoSys mConnect, http://www.infosys.com/products-and-platforms/mConnect/Pages/index.aspx
- AutoMate, http://www.networkautomation.com/company/
- Mobile Source, http://www.mobilesourceinc.com/

Mobile Inventory Management Platforms/Vendors

- Passport Mobile, ASAP Systems, (Inventory, Asset, and Item Tracking), http://www.asapsystems.com/passport_mobile.php
- FMS Mobile Inventory and Supply Chain Management, http://www.hand.com/mobile_supply_chain
- IBM Mobile Inventory Manager, (Bar code, RFID) http://www-01.ibm.com/software/tivoli/products/maximo-mobile-inventory-mng/
- PeopleSoft Mobile Inventory Management, Oracle, http://www.oracle.com/us/products/applications/peoplesoft-enterprise/scm/mobile-inventory-mgmt-193770.html
- Mobile Inventory Services, http://www.mobileinventory.org/
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Mobile Inventory Management Platforms/Vendors

- Mobile Inventory Solutions, AssetWorks, http://www.assetworks.com/mobile-inventory-solutions

- Mobile Application Inventory, http://www.mobileiron.com/en/solutions/mobile-app-management/mobile-application-inventory

- Mobile Inventory Navigator, https://itunes.apple.com/us/app/mobile-inventory-navigator/id531749415?mt=8

- iQ3 Barcode, https://itunes.apple.com/us/app/iq3-barcode/id532426111?mt=8

- Mobile Inventory, Phoenix Information Systems, LLC, http://www.completesoft.com/mobile_inventory.htm