Introduction to Mobile Middleware

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

From "Mobile Middleware: The Next Frontier in Enterprise Application Integration" by Tamara Kanoc
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 scarce resources
  - Adjust quality of service (QoS) – guarantee performance

- How should adaptation be supported?
  - Monitor resources and adapt appropriately

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

- Kurogo Mobile Platform, [http://kurogo.org/home/](http://kurogo.org/home/)
- Mobile SAAS Solutions (old ITAnyPlace), [http://www.saasmob.com/](http://www.saasmob.com/)
  - Smart App, Smart Inspection, Smart Work
Mobile Middleware Platforms/Vendors

- SAP Enterprise Mobile, [www.sap.com](http://www.sap.com)
- FMS Mobile Inventory and Supply Chain Management, [http://www.hand.com/mobile_supply_chain](http://www.hand.com/mobile_supply_chain)
- AutoMate, [http://www.networkautomation.com/company/](http://www.networkautomation.com/company/)

Mobile Inventory Management Platforms/Vendors

- FMS Mobile Inventory and Supply Chain Management, [http://www.hand.com/mobile_supply_chain](http://www.hand.com/mobile_supply_chain)
- Mobile Inventory Services, [http://www.mobileinventory.org/](http://www.mobileinventory.org/)
Mobile Inventory Management
Platforms/Vendors