Distributed Systems

Review For Midterm

Introduction(1)

- Characteristics
  - concurrent execution
  - message passing
  - no global clock
- Motivation
  - Sharing and communication

Introduction (2)

- Challenges
  - Security, scalability, heterogeneity, transparency, partials failure, concurrency
- Examples
  - The internet
  - The world wide web
    - three main technological components
  - Intranets
  - Mobile and ubiquitous computing

Sockets and Servlets (1)

- NetworkServer.java
  - TCP sockets
  - Java's ServerSocket and Socket classes
  - The decorator design pattern
- EchoServer.java
  - Inheritance
  - Adding HTTP to TCP
  - Adding HTML

Sockets and Servlets (2)

- QueryData.java
  - Adding a layer of abstraction
  - J2EE Servlets
  - Java's HttpServlet,
    - HttpServletRequest and
    - HttpServletResponse
    - classes

Servlets and Sockets(3)

- Stateful services
  - Session tracking
  - The singleton design pattern
  - Java's synchronized key word for concurrent use
  - Java's Cookie and HttpSession classes

Models and Architectures

Fundamental models (interaction, failure, security)

Architectural Models

Software/Hardware Layers

Middleware

Replication for performance, reliability, and fault tolerance

Thin clients

Network computers

Mobile agents

Mobile devices and service discovery

Android

- Applications
- Application Frameworks
- Component Model (Four types)
- Interprocess communication (Intents and AIDL)

Web Services(1)

- JAX-WS 2.0
- Annotations
- apt tool
- wsimport tool
- singleton design

Web Services(2)

- XML
- SOAP request/response format
- WSDL as IDL
- XML Schema
- Operations, Interfaces, and bindings
- registry lookup and bind
- Synchronous or asynchronous
- RPC style tightly coupled
- Document style less tightly coupled

Web Services(3)

- URN (URI's and URL's)
- Web service composition
- SOAP intermediaries
- Message Exchange Patterns
- WS-Addressing

Internetworking(1)

- IP as a key tool
- protocol layers
- TCP
- UDP
- IEEE 802 Standards
- IP addressing
- Ethernet (CSMA/CD)
- Ethernet addressing
- Routers
- RIP

Internetworking(2)

- Subnet masking
- DNS
- ARP
- DHCP
- ESwitches and Hubs
- NAT based routing
- MobileIP
- Wireless (CSMA/CA)

Interprocess Communications (1)

- Request/Reply protocol, failure handling, idempotent operations and histories
- When is Request/Reply/Acknowledge Reply used?
- Marshalling and external data representation
- Binary and Unicode
- Corba's CDR
- Java's Serializable interface
- Representation of Remote Object References
- Representation of request/reply

Interprocess Communications (2)

- UDP client and server
- Java's DatagramSocket and DatagramPacket classes
- TCP client and server
- Java's Socket and ServerSocket classes
- Multi-threaded server
- Java's Thread class
- Java's ObjectInputStream and ObjectOutputStream classes
- Hand coding skeletons and stubs example

Cloud Computing

- New opportunities
- Azure
- EC2
- AppEngine

Three Projects

- Servlets, Java Server Pages, web.xml configuration files
- Cryptographic hashin
- Knock Knock Web Application
- Sessions and cookies
- Knock Knock Web Service
- The apt tool and wsimport tool
- TCP/UDP Sockets
- Low Level RMI