

# STRUCTURED COMMUNICATION IN JAVA

## *TUTORIAL PRESENTATION*

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**Goals:** The goal of this tutorial is to explore Java based communication facilities in a hands-on setting. In particular the tutorial will explore from the client side:

String communication

Object communication

Error detection

Polymorphic communication

And also examine multithreading and synchronization at the server end.

**Format:** The tutorial will be presented in a lab setting with one computer system available for each attendee. The session will be structured into five segments.

### Segment 1: String Communication

In this segment introductory information will be provided on the conceptual base for socket communication including socket instantiation and stream binding. A functioning example will be provided (10 minutes). Attendees will then modify a pre-prepared sample client by adding the communications segments to the client (20 minutes).

### Segment 2: Object Communication

Segment two examines the construction of objects and the mechanisms used to send and receive objects. Exposition on serialization, the casting of incoming objects and catching unknown objects will then take place. (10 minutes) A second a pre-prepared sample client will then be modified to provide practice for the attendees (20 minutes).

### Segment 3: Error detection

In the third segment we simulate an unreliable communications channel, one that may garble, lose or duplicate packets. The algorithm for managing such errors is developed (10 minutes). A sample client is constructed that handles such error through CRC error checking and by examining packet numbers (20 minutes).

#### Segment 4: Polymorphic communications Objects

The final client segment provides for the construction of a generic communications class able to carry objects of any type. The structure of the communications class is developed (10 minutes) and incorporated into a pre-prepared sample client. Mechanisms for accepting, recognizing and handling the communication objects are discussed and developed (20 minutes).

#### Segment 5: Server Side Issues

The Server segment examines issues related to the construction of robust servers employing multithreading, to allow multiple clients to simultaneously access the server, and synchronization, to lock resources against simultaneous access by multiple clients. (15 minutes) A server is developed to serve an existing client. (30 minutes)

#### Conclusion

The session will conclude with a discussion of the concepts and issues raised within the tutorial, comments about deployment and security with client server applets and an overview of recent developments in Java including servlets and Jini.