Distributed Systems Programming Paradigms

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Syllabus

- Client-server paradigm.
- Distributed objects. Case studies: Java RMI.
- Event notification systems / message oriented middleware. Case study: AMQP.
- Patterns and architectural styles in distributed systems. Case study: REST (Representational State Transfer).

Client-server paradigm

- Client and server as roles.
- Request-reply protocol.
- Data-structure serialization.
- Request dispatch models: sequential, thread-per-client, thread-per-request.
- Connection management: per request, per client, support to multi-threaded clients.
- Stateful and stateless servers and idempotent requests.
- Client-server in procedural languages: RPC, IDL, IDL compiler; case study: ONC RPC.

Distributed objects

- Objects, remote invocation and distributed systems.
- Object identity.
- Parameter passing.
- Object copy and migration.
- Distributed garbage collection.

Java RMI

- Differences from traditional java object model.
- Parameter passing.
- Serializable interface.
- Remote interfaces.
- Remote object implementation.
- Threading model.
- Name service.
- Remote object garbage collection.
- Code mobility.

Event notification systems / message oriented middleware

- Publish-subscribe paradigm.
- Notification systems characteristics.
- Event subscription models.
- Notification routing algorithms. Content-based routing.
- Case study: AMQP.

Patterns and architectural styles in distributed systems

- Factories and the object life-cycle.
- Transient and persistent objects.
- A taxonomy of architectural styles.
- The representational state transfer (REST) architectural style.

Bibliografia

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- RESTful Web Services, Leonard Richardson, Sam Ruby, O´Reilly 2007.