

TK1 Exercise 3

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Task 1.1: Threading

Explain in a few sentences (in your own words) the introduced concepts of a Monitor.

- Monitor is a module which is an encapsulation of variables and procedures.
- In a parallel execution environment , if two processes are non compatible - operate on same object and may lead to race condition, should always enter a monitor prior to execution.
- Usage of monitor confirms the exclusive access of the resources to single proces

Task 1.2: Transparency in Java RMI

Describe for each type of transparency (cmp. Chapter 1) if it is provided by RMI and give a short explanation why.

Transparency type	Part of RMI	Comments
Access transparency	Yes	Local and Remote methods have identical semantics of invocation.
Location transparency	Yes	Method invocation is through a proxy object, also obtained transparently using registry service, user will be fully transparent to the physical location of the object or the remote server.
Concurrency transparency	Yes	Multiple clients can invoke the same method on object reference, synchronization will be taken care by the server implementation.

Performance transparency	No	Marshaling and unmarshaling in addition to data transfer delays over the network would not yield same performance as that of a local call.
Replication transparency	Yes	All these four transparencies are part of RMI, since both caller and callee are decoupled and the communication happens through a reference acquired from a registry service.
Failure transparency	Yes	
Mobility transparency	Yes	
Scaling transparency	Yes	

Task 1.3: RMI - single-threaded vs. multi-threaded

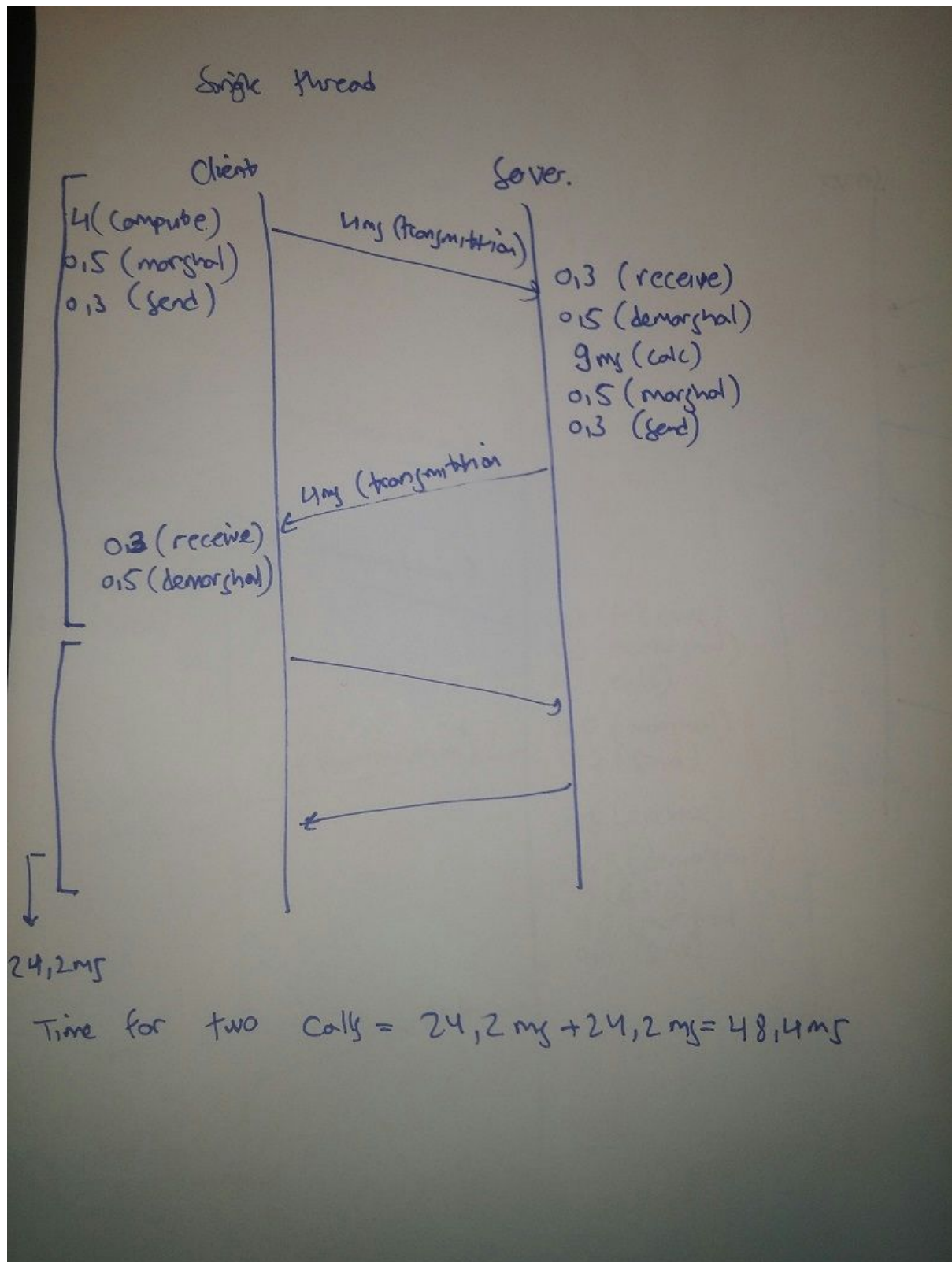
A client executes RMI on a server. The client requires 4 ms to compute the arguments for each request, and the server requires 9 ms to process each request. The process time of the local operating system of each send or receive operation is 0.3 ms and the network time to transfer the request or response is 4 ms. The Marshalling and Demarshalling takes 1 ms in total per message.

Estimate the time, which the client requires to generate two requests and obtain a refund, if

- 1. it is single-threaded**
- 2. it has two threads, which can generate concurrent requests on a single processor. The server, which has also one processor, processes the requests in order of the received message.**

Solution starts in the next page

1. For single client thread and server thread scenario



2. For 2 client threads and a single server thread scenario

