Politecnico di Milano – V Facoltà di Ingegneria

088924 – Tecnologie di middleware per sist. dist. (Ord. 270)

Prof. G. Cugola - February 25, 2011

Rules:

- **You are not allowed to use books, notes, or other material.**
- **You can answer in Italian or English.**
- **Total time for the test: 1.5 hour.**

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1. Implement a `SoftSyncArray` class in Java. The size of the array must be specified at creation time. Method `put(Object value, int pos, int lease)`, puts an element into the specified position for the given time (in seconds). Method `get(int pos)` returns (but not removes) the value associated at pos if it is available and it has not expired yet, otherwise it suspends the caller until a value is added. Each instance of the class must instantiate a garbage collector, which periodically frees expired elements. Maximize parallelism.

2. Write the IDL interface of a CORBA server to access the status of a PC. You should be able to read the PC configuration and status (only type of CPU, current temp, and current frequency), to switch the PC on/off, and to register a listener for alarms. Write all the interfaces and data structures that must be public for the system to operate.

3. Write in TinyOS the interface of a module to read data (8 bit integer numbers) from an ADC converter. The ADC may operate in single shot mode or periodically. The former mode uses a split phase operation to read single data values. The latter mode is enabled through a `start` operation that specifies the period and a `stop` operation to interrupt reading.

4. Write an Erlang function `sumFour` that takes a list of number and computes the sum of its elements four by four, storing them into a new list. For example:

   ```
   sumFour([1,2,3,4]) = [10]
   sumFour([]) = []
   sumFour([1, 2, 3, 4, 5, 6, 7, 8, 9, 10]) = [10, 26, 19]
   ```

   Is your implementation of `sumFour` tail recursive? May you change it to be tail recursive?