# Rdsm: Distributed (Quasi-)Threads Programming in R

, Gaithersburg, MD
July 21, 2010

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  - bigmemory
  - attached C (OpenMP, CUDA)

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- Many in the parallel processing community consider shared-memory paradigm to be clearer, more concise, e.g. Chandra (2001), Hess (2002).
- Conversion from sequential code easier than in message-passing case.

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  - E.g. Web servers.

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  - Shared-memory vehicle for R, providing threads-like environment.
  - Distributed computing capability, e.g. for collaborative tools.
- Easy to build on my previous product, PerlDSM (Matloff, 2002).

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- Platforms:

Processes can be on the same mulicore machine or on distributed, geographically disperse machines.

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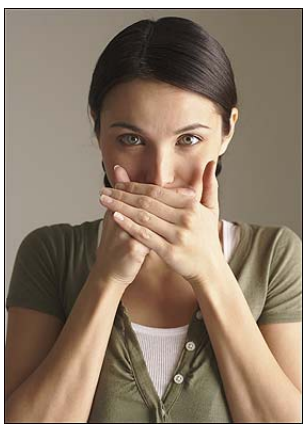

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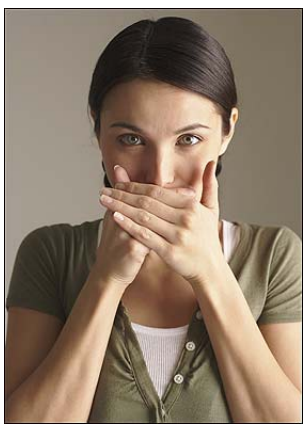

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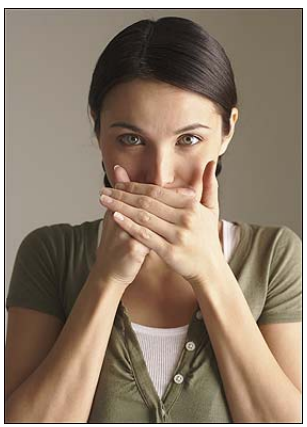

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- Even games!

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And it IS shared: If process 3 executes the above and then process 8 does

```
x <- m[2,5]
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then **x** will be 1 at process 8.

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Otherwise, it's ordinary R syntax, with threads.

# Embarrassingly Parallel Example: Find Best k in k-NN Regression

Rdsm provides the familiar threads shared-memory environment.

```
# have SHARED vars minmse, mink best found so far
# each process executes the following
rng <- findrange()  # range of k for this process
for (k in rng$mystart:rng$myend) {
    mse <- crossvalmse(x,y,k)
    lock("minlock")
    if (mse < minmse) {
        minmse <- mse
        mink <- k
    }
    unlock("minlock")
}
```

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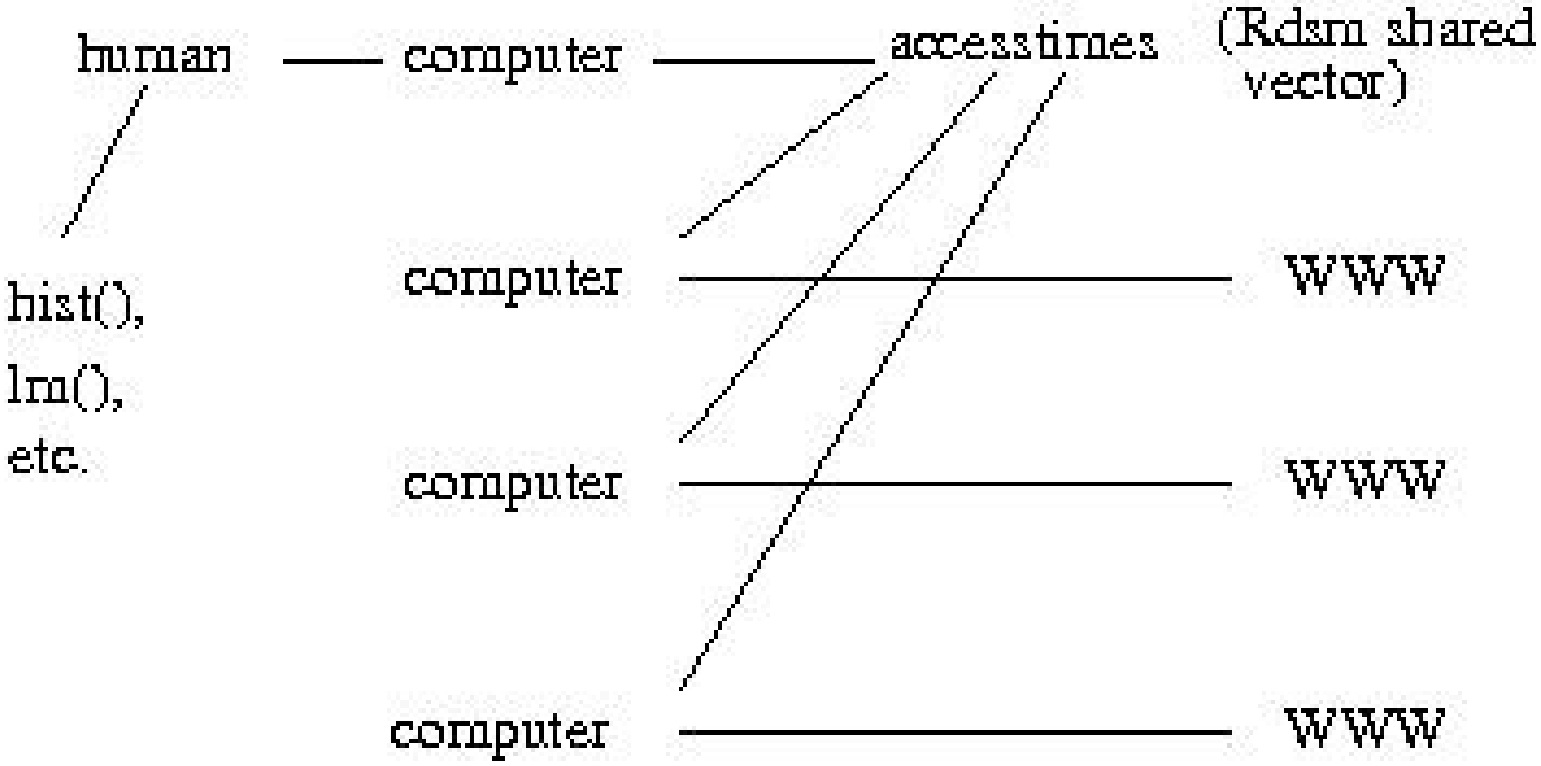

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- those 3 threads write access times to the shared vector **accesstimes**
- in 4th thread, human gives R commands, reading the shared vector **accesstimes**
- the human applies R's myriad statistical operations to the data at his/her whim—concurrently with the data collection

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- if n participants, then 2n Rdsm threads
- for a participant, one thread watches **latestbid**, the other submits bids

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- **wait()**, **signal()**: Watcher threads call **wait()**, bidder threads call **signal()**.
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- **fa()**: Fetch-and-add, to atomically decrement **nbidders** when someone drops out.

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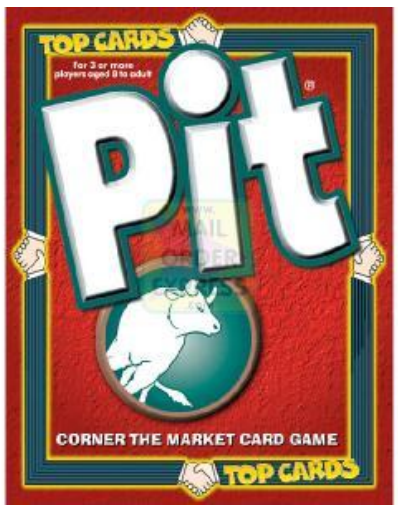


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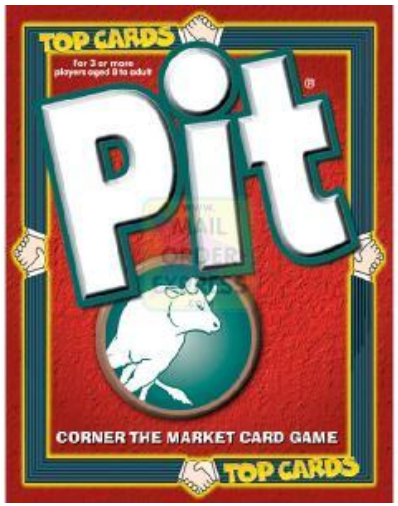


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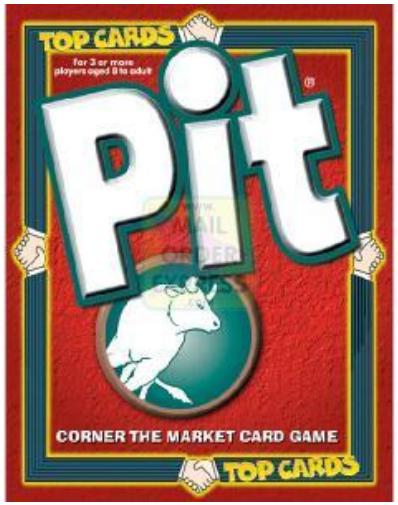


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- Transaction coding tricky; when is a trade "official"?

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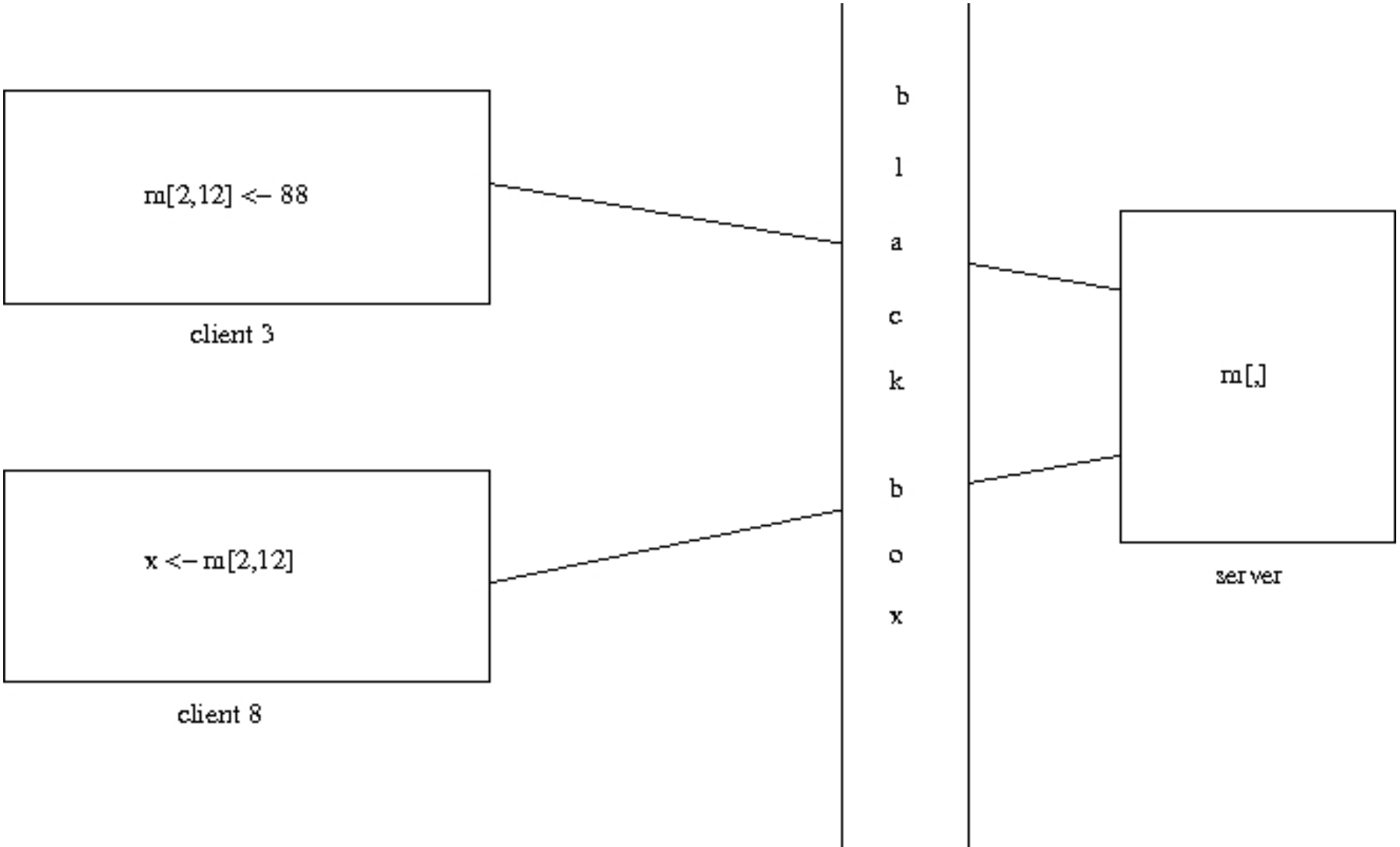

# Comparison to bigmemory

- Rdsm has functions for threads infrastructure[1]
- Rdsm is usable across fully independent machines[2]
- bigmemory may be faster on embarrassingly parallel apps

[1] I've written an incomplete set for bigmemory.

[2] but could try bigmemory with NFS files