Tcl Distributed Programming

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On "zonker"

dpsh: MakeRPCServer 4545 4545

dpsh: set lastId 0 0

dpsh: proc GetID {} {
    global lastId
    incr lastId
    return $lastId
}

GetID

dpsh: GetID 1

dpsh: GetID 2

On another host

dpsh: set server [MakeRPCClient zonker 4545]

file3

dpsh: RPC $server GetID 3

dpsh: time {RPC $server set a 5} 100

4332 microseconds per iteration
1) MakeRPCServer 4545

2) MakeRPCClient zonker 4545

3) Connection established!
Other Features

- **RDO for concurrency**
  ```tcl
time \{RDO file3 set a 5\} 1000
0.5 milliseconds/iteration
RDO file3 -callback RDO_done parallelCmd
  ```

- **Timeouts**
  ```tcl
RPC file4 -timeout 1000
  -timeoutReturn RPCTimeout
myCommand
  ```
Deadlock Resolution

- **How deadlock happens**
  1) A calls B, reads socket for reply
  2) B receives RPC, and calls A
  --> Deadlock!

- **Solution: non-blocking RPC**
  1) A calls B, enters event loop
  2) B receives RPC, calls A, and enters event loop
  3) A receives RPC, evals and returns
  4) B finishes up and returns.

- **Can process more than RPC!**
  Filehandlers, X, Idle, and Timer Events.
More Complex RPC Example

Process C

Event Loop 1

Event Loop 2

Event Loop 3
Object Protocol

• "Object" Messages
Creation:  `point apt -x 5 -y 5`
Get All Slots:  `apt config`  ->  `{{-x 0 5} {-y 0 5}}`
Get One Slot:  `apt slot-value -x`  ->  `5`
Set One Slot:  `apt configure -x 9`

• Setting/Getting Slot Values
`setf object slotname value`
`getf object slotname`
Distributed Objects

- **DistributeObject** `apt file4 point`
  1) Get all slot name/value pairs (using config)
  2) RPC to remote process to create object
  3) Keep table of object owners, clients

- **Setting A Slot**
  If we own the object, send `downsetf` RDO to all clients
  If we don’t own, forward setf request to owner

- **Triggers**
  Called on `downsetf` to eval some Tcl code
Open Issues

- Security
- Multithreading
- Name Services