Tcl Distributed Programming

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Introduction to Tcl/DP

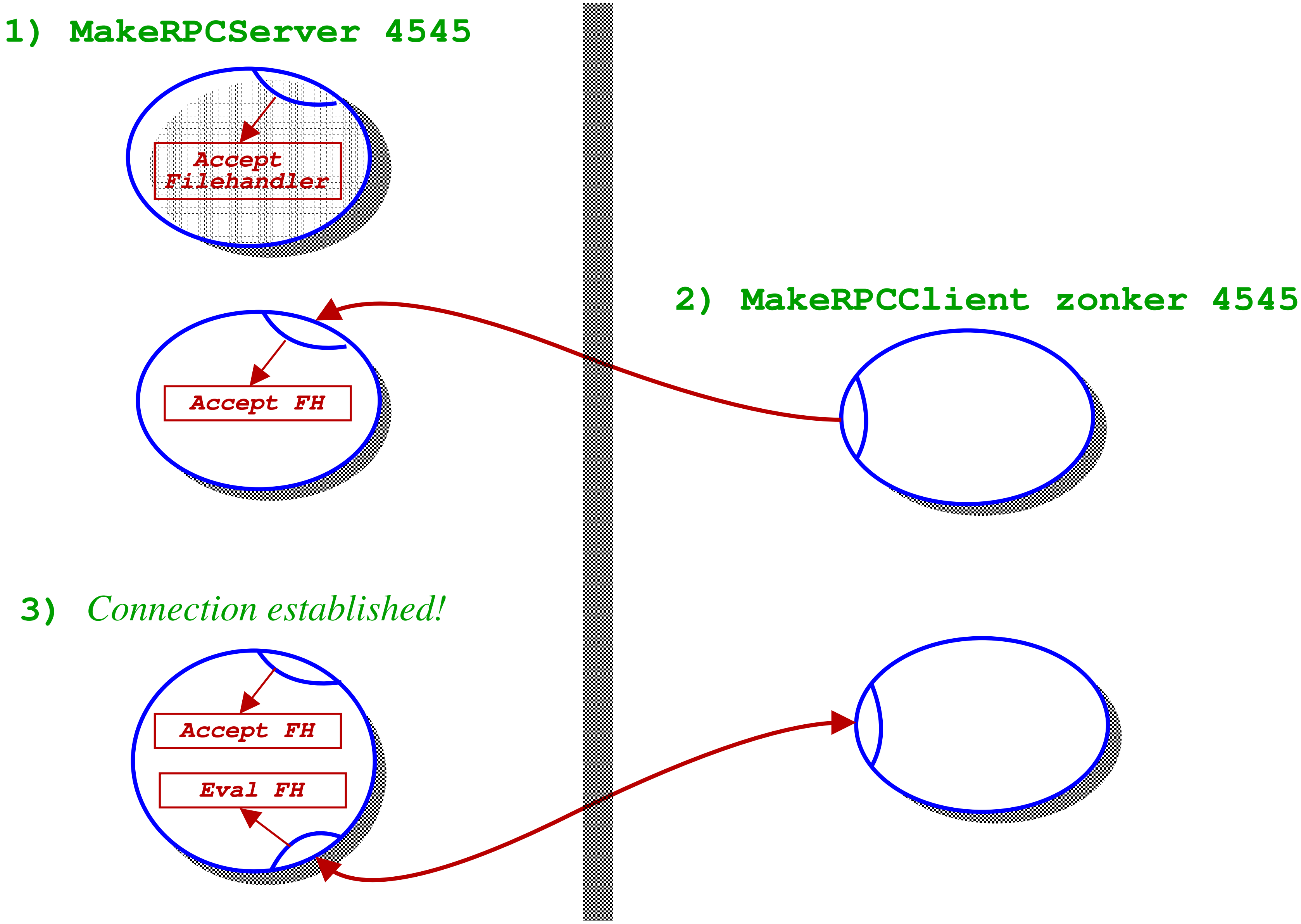
On "zonker"

```
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
```

Internals


1) MakeRPCServer 4545
Accept
Filehandler
Accept FH
2) MakeRPCClient zonker 4545
3) Connection established!
Accept FH
Eval FH

Other Features

- **RDO for concurrency**

```
time {RDO file3 set a 5} 1000
```

0.5 milleseconds/iteration

```
RDO file3 -callback RDO_done parallelCmd
```

- **Timeouts**

```
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

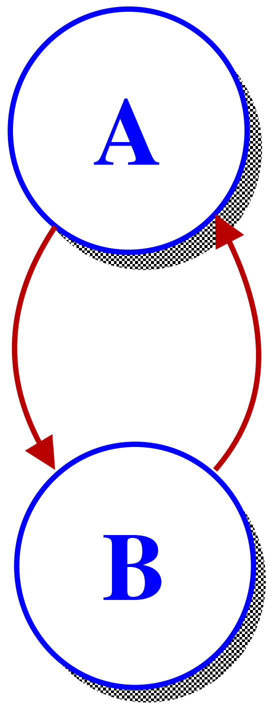
  2) B receives RPC, calls A, and enters event loop

  3) A receives RPC, evals and returns

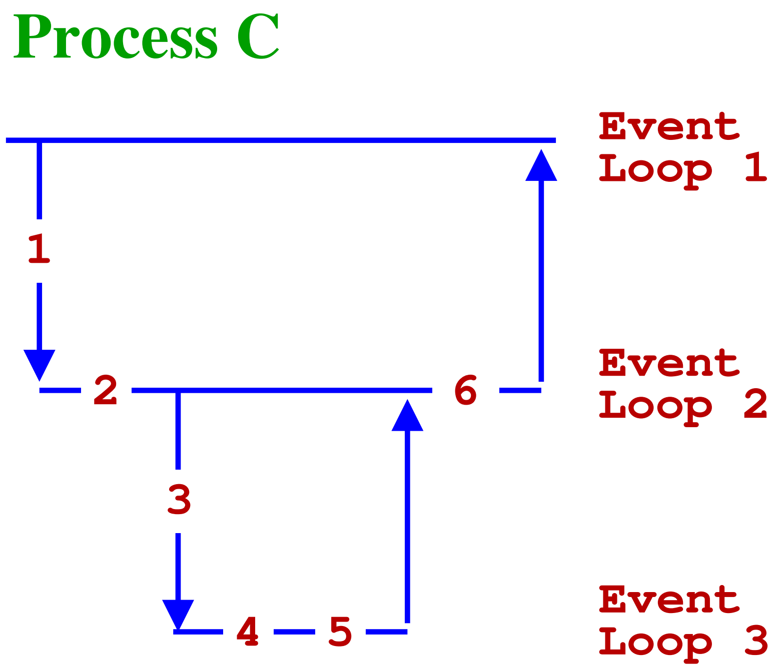
  4) B finishes up and returns.

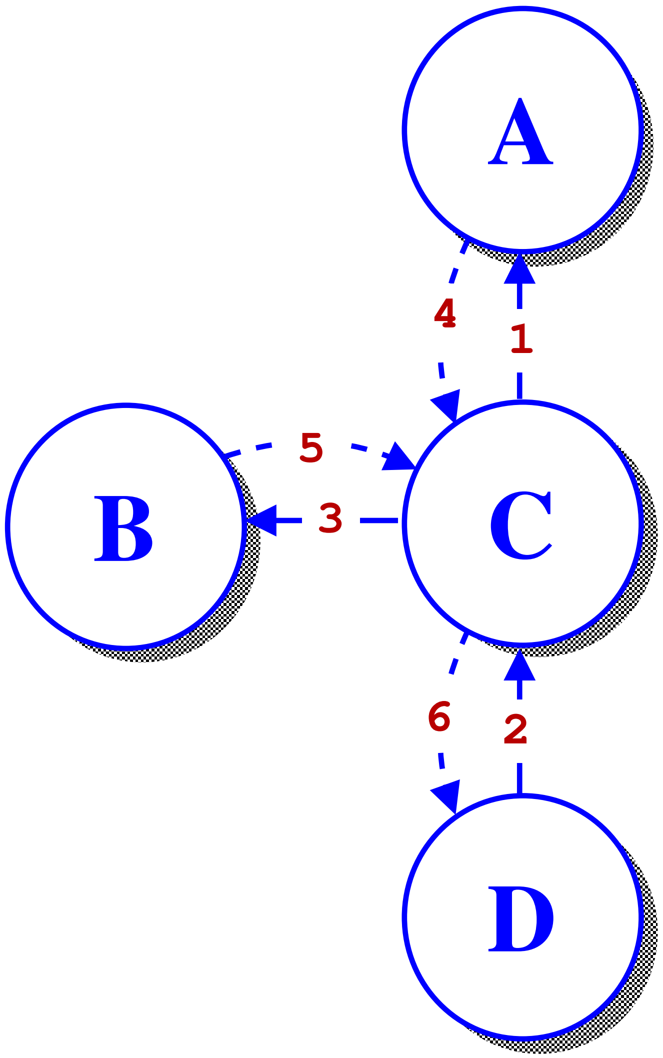
- **Can process more than RPC!**

  Filehandlers, X, Idle, and Timer Events.



More Complex RPC Example





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

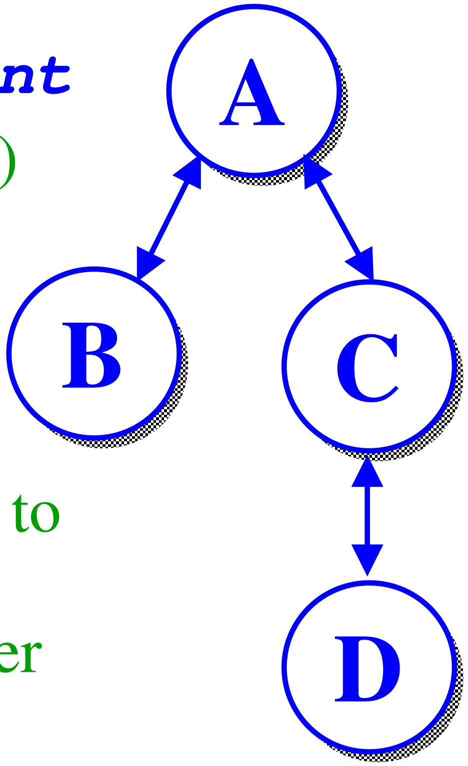
- **Setting A Slot**

  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**