

```

module Waiter[t = 0 to 4]
  op getforks(int), relforks(int); # for philosophers
  op needL(), needR(),           # for waiters
    passL(), passR();
  op forks(bool,bool,bool,bool); # for initialization
body
  op hungry(), eat();           # local operations
  bool haveL, dirtyL, haveR, dirtyR; # status of forks
  int left = (t-1) % 5;         # left neighbor
  int right = (t+1) % 5;        # right neighbor

  proc getforks() {
    send hungry(); # tell waiter philosopher is hungry
    receive eat(); # wait for permission to eat
  }

  process the_waiter {
    receive forks(haveL, dirtyL, haveR, dirtyR);
    while (true) {
      in hungry() ->
        # ask for forks I don't have
        if (!haveR) send Waiter[right].needL();
        if (!haveL) send Waiter[left].needR();
        # wait until I have both forks
        while (!haveL or !haveR)
          in passR() ->
            haveR = true; dirtyR = false;
          [] passL() ->
            haveL = true; dirtyL = false;
          [] needR() st dirtyR ->
            haveR = false; dirtyR = false;
            send Waiter[right].passL();
            send Waiter[right].needL()
          [] needL() st dirtyL ->
            haveL = false; dirtyL = false;
            send Waiter[left].passR();
            send Waiter[left].needR();
        ni
        # let philosopher eat, then wait for release
        send eat(); dirtyL = true; dirtyR = true;
        receive relforks();
      [] needR() ->
        # neighbor needs my right fork (its left)
        haveR = false; dirtyR = false;
        send Waiter[right].passL();
      [] needL() ->
        # neighbor needs my left fork (its right)
        haveL = false; dirtyL = false;
        send Waiter[left].passR();
    }
  }
}
end Waiter

```

```
process Philosopher[i = 0 to 4] {
  while (true) {
    call Waiter[i].getforks();
    eat;
    call Waiter[i].relforks();
    think;
  }
}

process Main { # initialize the forks held by waiters
  send Waiter[0].forks(true, true, true, true);
  send Waiter[1].forks(false, false, true, true);
  send Waiter[2].forks(false, false, true, true);
  send Waiter[3].forks(false, false, true, true);
  send Waiter[4].forks(false, false, false, false);
}
```

Figure 9.21 Decentralized dining philosophers.