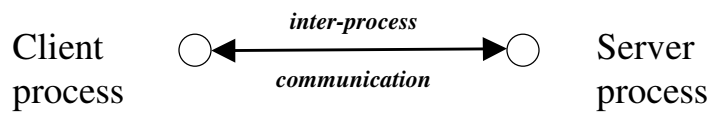


Linux Networking: network services

David Morgan

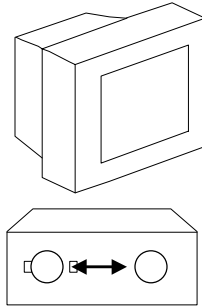
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Client and server: matched pairs



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OK as long as there's a way to talk



- Client process
- Server process

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OK as long as there's a way to talk



- Client process
- Server process

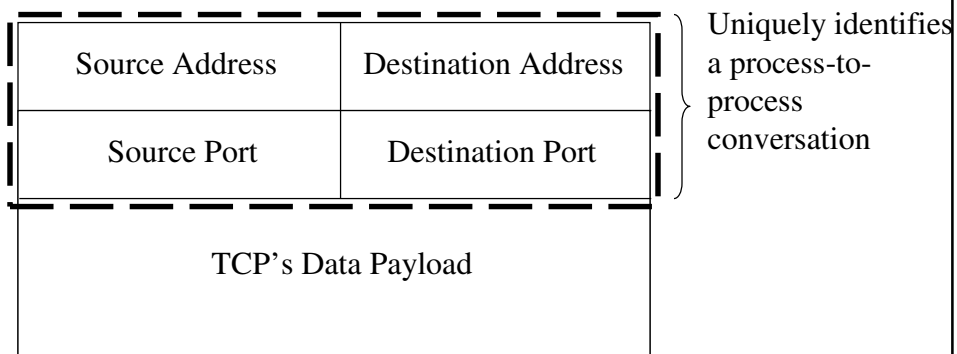
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Trans-net way to talk: socket programming

- a communications interface/mechanism
- like IPC (inter-process communications)
- but generalized to span machines
(*inter-machine*-inter-process)
- coded like file handles
- sockets correspond to service “ports” of TCP
and UDP

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Ports and conversations



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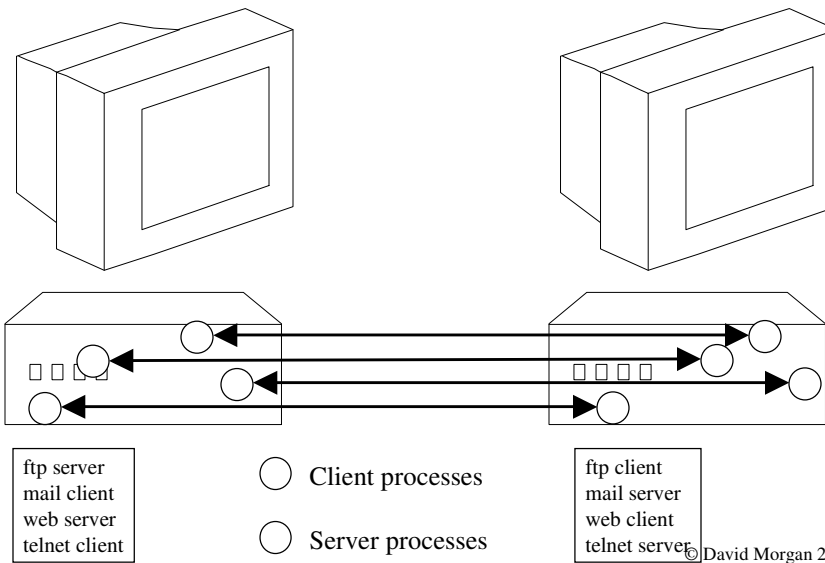
Distinction: machine vs process



- Client process
- Server process

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Distinction: machine vs process



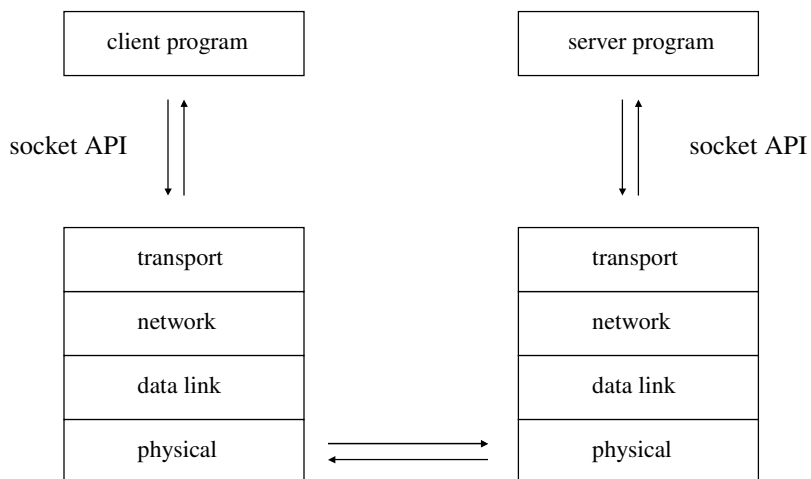
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Service processes: 2 ways to run

- As servers in their own right
 - contain socket API code themselves
 - actively listen for incoming connections on a port
- Under control of xinetd “super server”
 - don’t contain socket code
 - don’t listen for connections
 - xinetd listens on their behalf

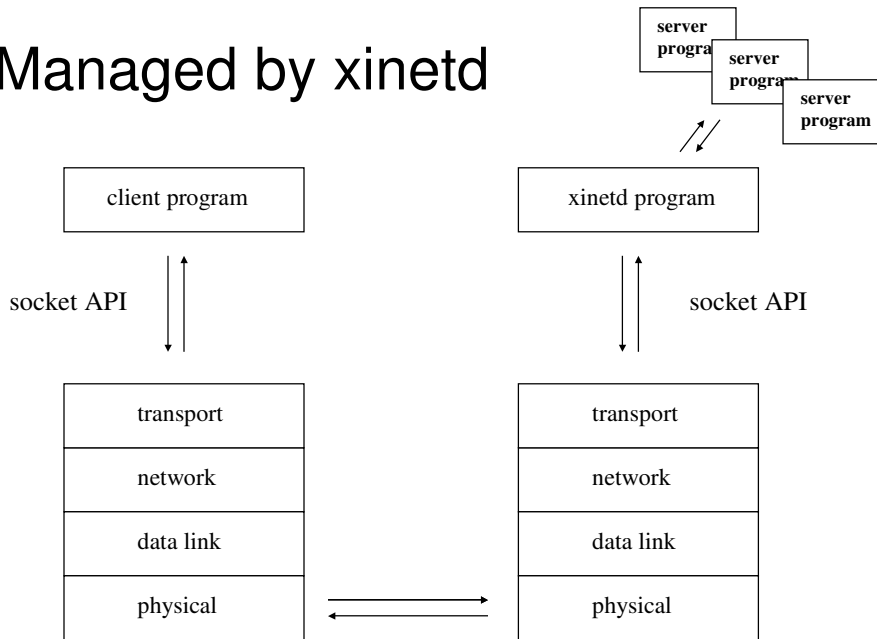
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Servers in their own right



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Managed by xinetd



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Examples, run on their own

- httpd web/browsing service
- smtp message transfer (mail) service

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Examples, managed by xinetd

- ftp file transfer service
- telnet remote login service
- pop3 message retrieval (mail) service

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xinetd operation

- a server that manages servers
- listens to other servers' ports, for them
- responds to an incoming connection
 - starts server associated with connection's port
 - connects server's standard I/O to that port
 - lets server die when connection closes

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xinetd purposes

- economize number of services running
- provide access control to managed services
- provide logging to managed services
- let any program be a special-purpose server

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xinetd configuration

- `/etc/xinetd.conf`
- defines services managed by xinetd

```
service <service name>
{
    attribute = value
    .
    .
    .
}
```

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Sample configuration: telnet

```
service telnet
{
    disable = no
    flags    = REUSE
    socket_type = stream
    wait     = no
    user     = root
    server   = /usr/sbin/in.telnetd
    log_on_failure += USERID
}
```

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Default RedHat xinetd.conf

```
# Simple configuration file for xinetd
# Some defaults, and include /etc/xinetd.d/
defaults
{
    instances          = 60
    log_type           = SYSLOG authpriv
    log_on_success     = HOST PID
    log_on_failure     = HOST
    cps                = 25 30
}
includedir /etc/xinetd.d
```

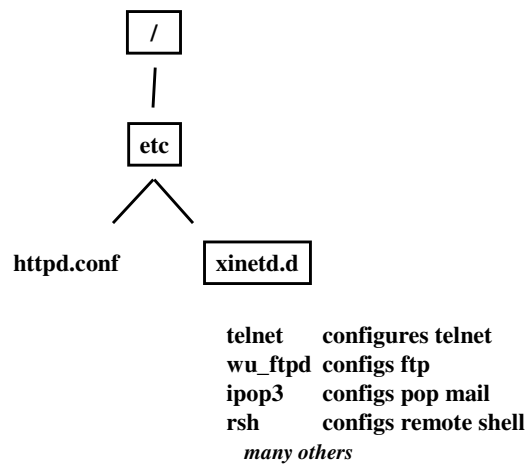
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includedir=/etc/xinetd.d attribute

- all files in /etc/xinetd.d included by extension
- you can specify services one per file
- packages drop config files in /etc/xinetd.d to be picked up automatically by xinetd

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Default directories and files



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Required attributes (others optional)

```
service <service name>
{
    socket_type = ...
    user = ...
    server = ...
    wait = ...
}
```

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Required attributes

- **socket_type** stream/dgram - TCP or UDP
- **user** username - user as whom service should run
- **server** path – path to server executable
- **wait** yes/no – should xinetd butt out till server quits?

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Other attributes

- **disable** yes/no – disables service
- **log_on_failure** special – info to log for access denials
- **no_access** matchlist – deny to specified addresses
- **only_from** matchlist – from specified addresses only
- **bind** interface – where to make service available
- **log_type** special – choose log file or syslog
- **redirect** ipaddr – pass traffic to another host

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Turning self-managed services on and off

- Services re-read configuration files when restarted
- Starting
 - /etc/rc.d/init.d/*<script for service>* start *or*
 - **service <script for service> start**
- Stopping
 - /etc/rc.d/init.d/*<script for service>* stop *or*
 - **service <script for service> stop**

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Turning xinetd-managed services on and off

- Adjust service's config stanza (in xinetd.conf) or file (in /etc/xinetd.d)
 - disable = off (to turn on)
 - disable = on (to turn off)
- Restart xinetd
 - /etc/rc.d/init.d/xinetd start *or*
 - **service xinetd start**

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The services file

- /etc/services
- maps service names to port numbers
- used by several standard library routines
- e.g., “telnet mybox smtp” instead of “telnet somebox 25”

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/etc/services

/etc/services:

```
ftp-data    20/tcp
ftp         21/tcp

telnet      23/tcp

smtp        25/tcp      mail

domain      53/tcp      nameserver  # name-domain server
domain      53/udp      nameserver

http        80/tcp      www www-http # WorldWideWeb HTTP
```

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Detecting services & conversations

- `ps ax | grep <service/daemon name>`
snapshot of active processes/services
- `netstat -ap`
displays services corresponding to ports

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Talking to a service: SMTP

- Uses port 25
- telnet <mailserver IP> 25
- Try SMTP commands
 - HELO
 - MAIL FROM:<sender>
 - RCPT TO:<recipient>
 - DATA
 - QUIT

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Talking to a service: POP3

- Uses port 110
- telnet <mailserver IP> 110
- Try POP3 commands
 - USER username
 - PASS password
 - LIST
 - RETR msg#
 - DELE msg#
 - QUIT

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Talking to other services

- FTP
 - telnet <server IP> 21
 - RFC 959
- SSH
 - telnet <server IP> 22

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Network Services – quick start

- to serve web pages, out of the box*
 - Put them in /var/www/html
- to serve files, out of the box
 - Put them in /var/ftp/pub

* RedHat, having chosen “everything”
package installation choice

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