Name based sockets

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http://www.ietf.org/id/draft-ubillos-name-based-sockets-01.txt

Name Based Sockets !

Making application development easier

SICS

The general problem

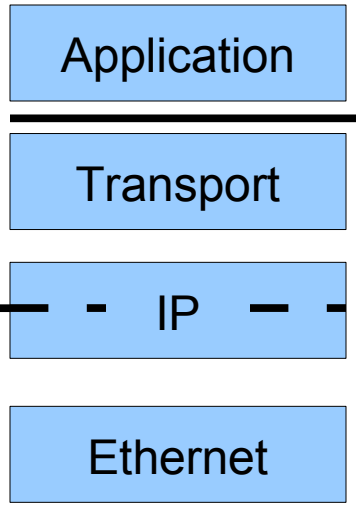
All IP (locator) management is done by the application.

There for, all interesting features need to be implemented by the application.

- Mobility
- Multi-homing
- IPv4/IPv6 interoperability
- NA(P)T traversal
- Path diversity exploitation
- Etc...

```
addr = gethostbyname( someString );
 ...
connect( ..., addr, ... );
write( ... );
close( ... );
connect( ..., addr, ...);
write( ... );
close( ... );
```

Two typical approaches



Socket abstractions

- .NET
- Java
- Python
- ...
- Practically any language or framework

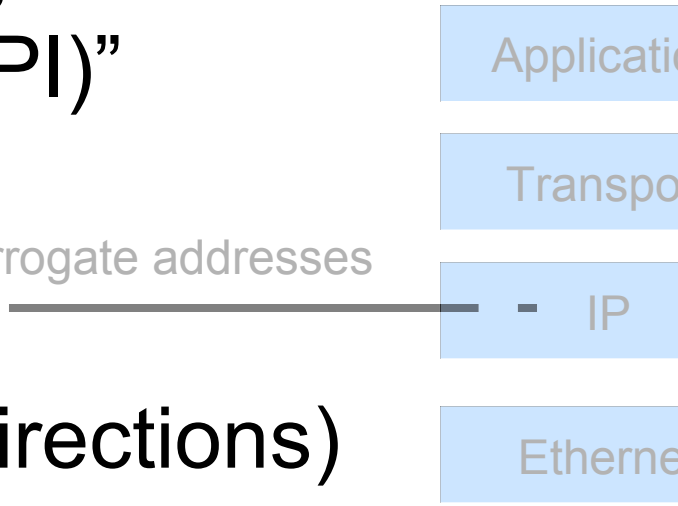
Surrogate addresses

- HIP
- Shim6
- MobileIP
- Provider Independent addresses (e.g. with BGP)

Surrogate addresses

"Application transparency gives backwards compatibility (API)"

- Extra name spaces.
- Extra resolutions (more indirections)
- Applications are not aware, hence still might try to solve issues in app-space.



Socket abstractions

Developers seem to like them...

- One implementation for every framework
- More often than not
  - Resolve once
  - Reuse IP
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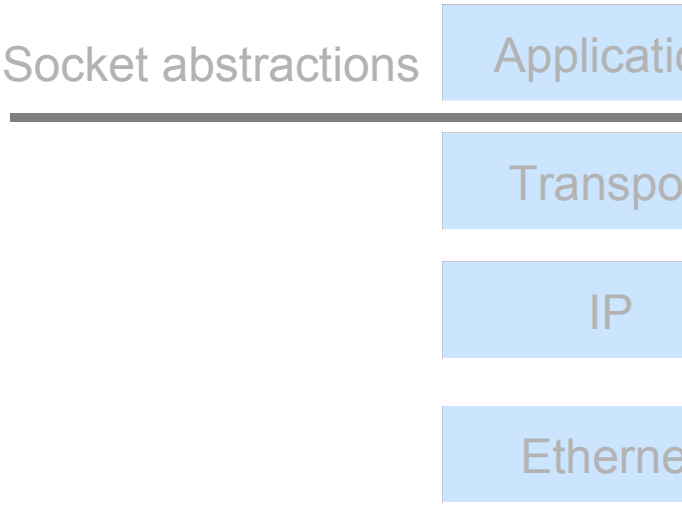


What do we want?

- No new indirections
- No new delays (e.g. first packet delay)
- Address management
  - Mobility
  - Multi-homing
  - Renumbering
  - IPv4/IPv6 interoperability
  - NAT penetration
- Backwards compatibility

Components

- API
- Initial name exchange
- Address updates
- Backwards compatiblity (on the road map)

API

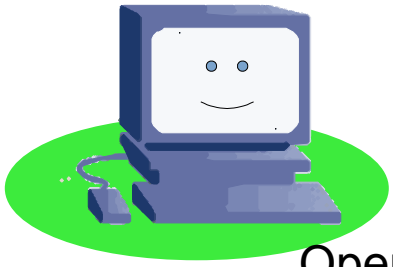
```
fd = socket( AF_NAME, SOCK_STREAM, 0);
struct sockaddr_name name_sock;

// Initialize name_sock with remote name

bind( fd, name_sock, sizeof(name_sock));
connect( fd, name_sock, sizeof(name_sock));

write(fd, send_buffer, len);
read(fd, recv_buffer, len);
```

The components (API)

- listen() - Prep for incoming session
  - fd = listen(local_name, peer_name, service, transport);
- open() - Initiate outgoing session
  - fd = open(local_name, peer_name, service, transport);
- accept() - Receive incoming session
  - accept(peer_name, fd);</t>
- read() - Receive data
  - data = read(fd);
- write() - Send data
  - write(fd, data);
- close() - Close session
  - close(fd);

Initial name exchange

Traditional

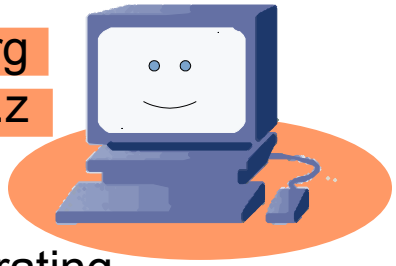


Name: host.left.org
IP: a.b.c.d

Application

Operating system

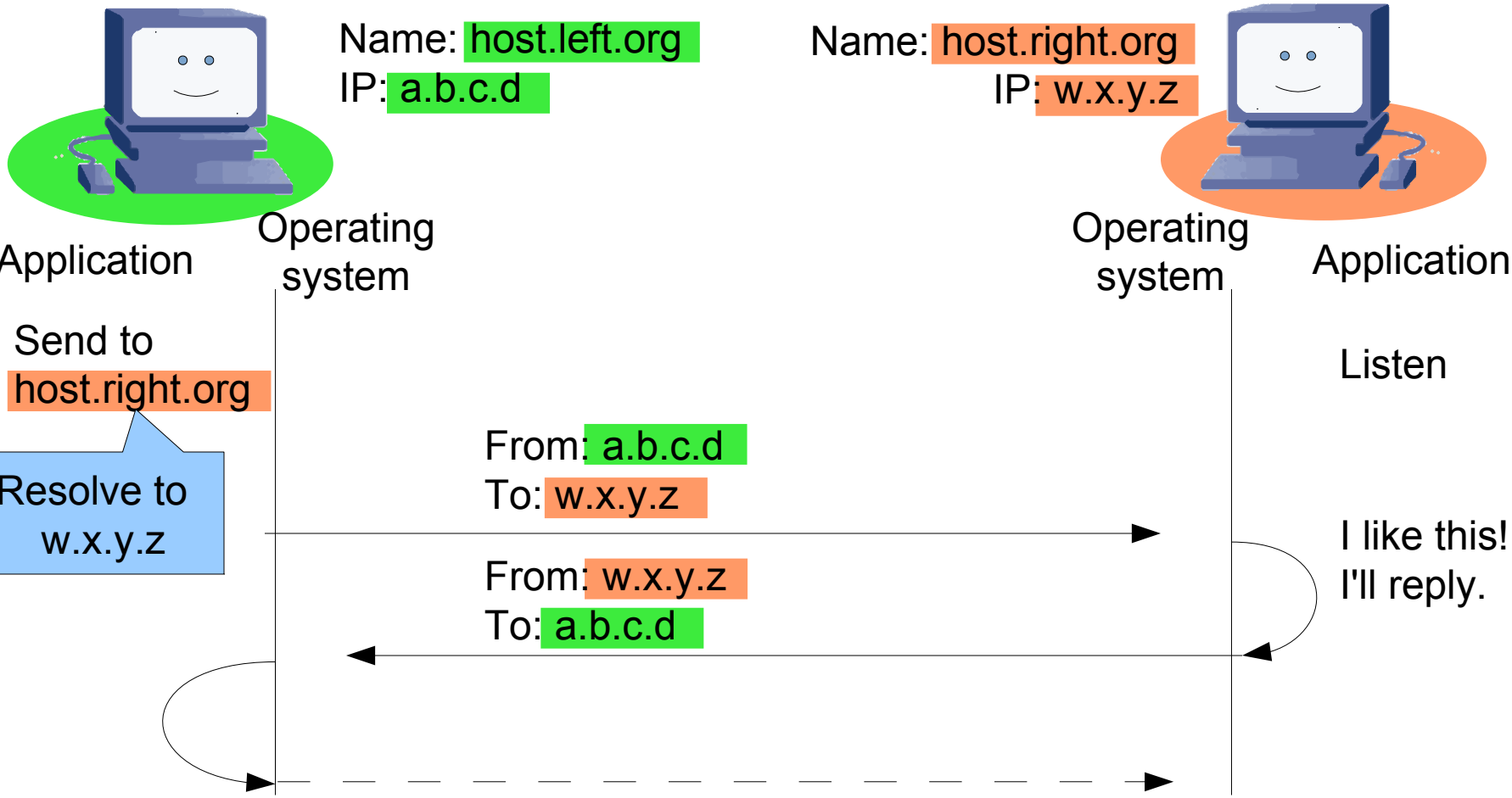
Name: host.right.org
IP: w.x.y.z



Operating system

Application

Traditional



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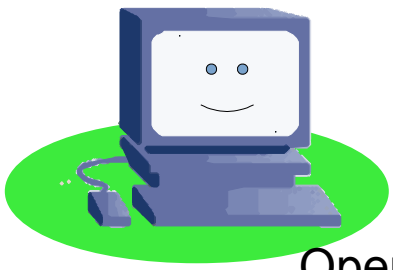
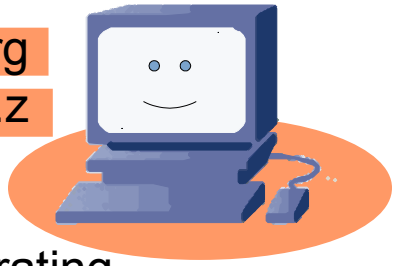
Name exchange



Name: host.left.org
IP: a.b.c.d

Name: host.right.org
IP: w.x.y.z



Application

Operating system

Resolve to w.x.y.z

Operating system

Application

Listen

Send to host.right.org

From: a.b.c.d
To: w.x.y.z

From: host.left.org
To: host.right.org

I like this!
I'll reply.

From: w.x.y.z
To: a.b.c.d

From: host.right.org
To: host.left.org

Name in the reply = Upgraded hosts!

From: a.b.c.d
To: w.x.y.z

From: w.x.y.z
To: a.b.c.d

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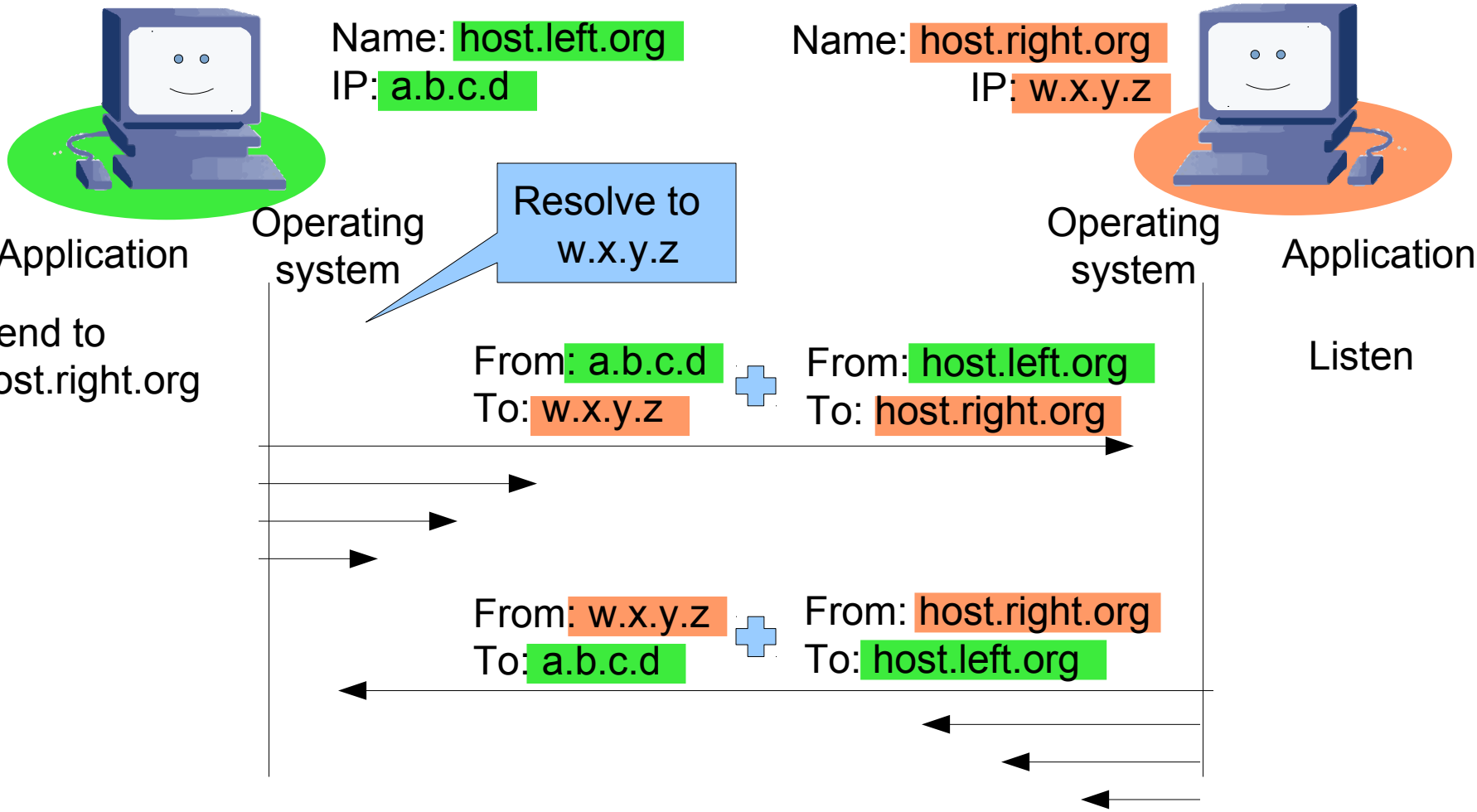
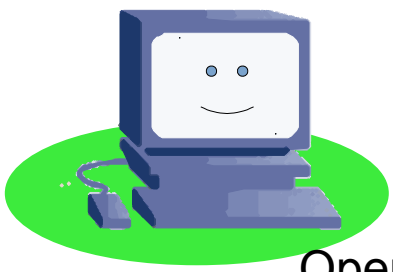
Name exchange

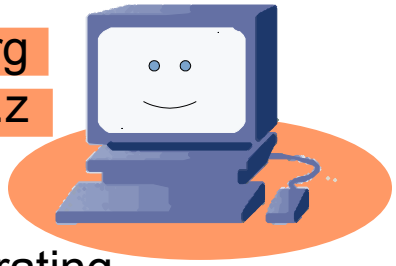


Backwards compatibility



Name: host.left.org
IP: a.b.c.d

Name: host.right.org
IP: w.x.y.z



Application

Operating system

Resolve to w.x.y.z

Operating system

Application

1. Send to host.right.org

From: a.b.c.d
To: w.x.y.z

From: host.left.org
To: host.right.org

Ignore that weird extension. But reply to the packet.

From: w.x.y.z
To: a.b.c.d

No name-header sent back.
I'll try N more times and then giveup.

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The current prototype

- Supports TCP
  - Uses TCP semantics
    - socket(), listen(), open(), accept(), read(), write()
- Supports Shim6
  - Well, to a certain extent, we are working on it :)
- Exchanges names
- Linux
  - Ubuntu (client/server)
  - Android (client)

Implementation by Juan Lang (UC Davis)
and by Zhongxing Ming (Tsinghua University)

Current development

- Support for UDP
  - Using TCP-like semantics
- Mobility/Multi-homing
  - Shim6
- Collaboration between
  - Ericsson
  - Tsinghua University
  - Swedish Institute of Computer Science

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The road map

- IPv4/IPv6 Interoperability
- NAT penetration
- Path diversity utilization
- Naming resolution (depth)
  - Host
  - Application
  - Etc...

- And more... Do you have any suggestions? Please let us know!

Questions?