

IPV6 only diet

November 8, 2011

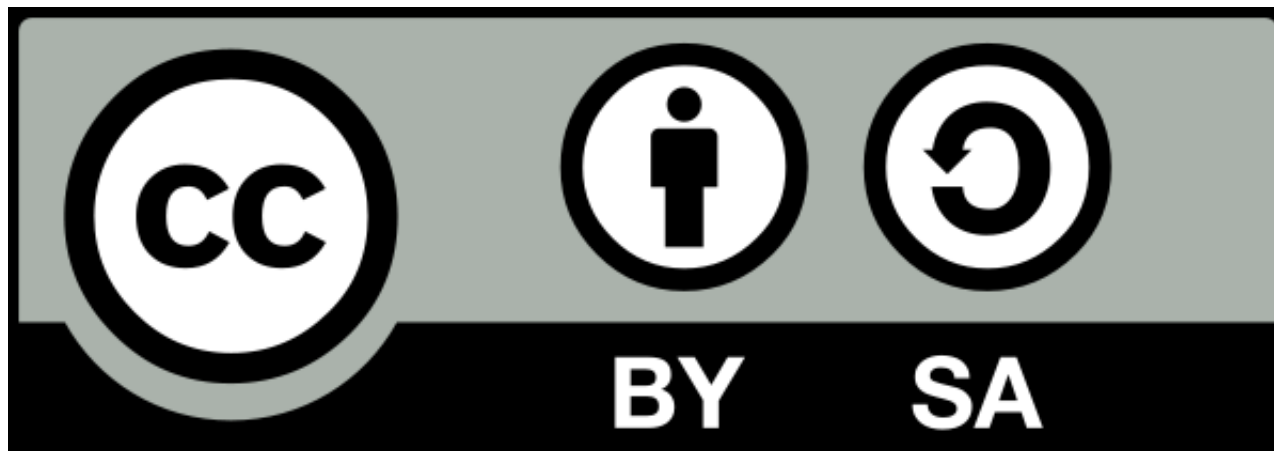
Mark Jenkins

Member



<http://parit.ca>

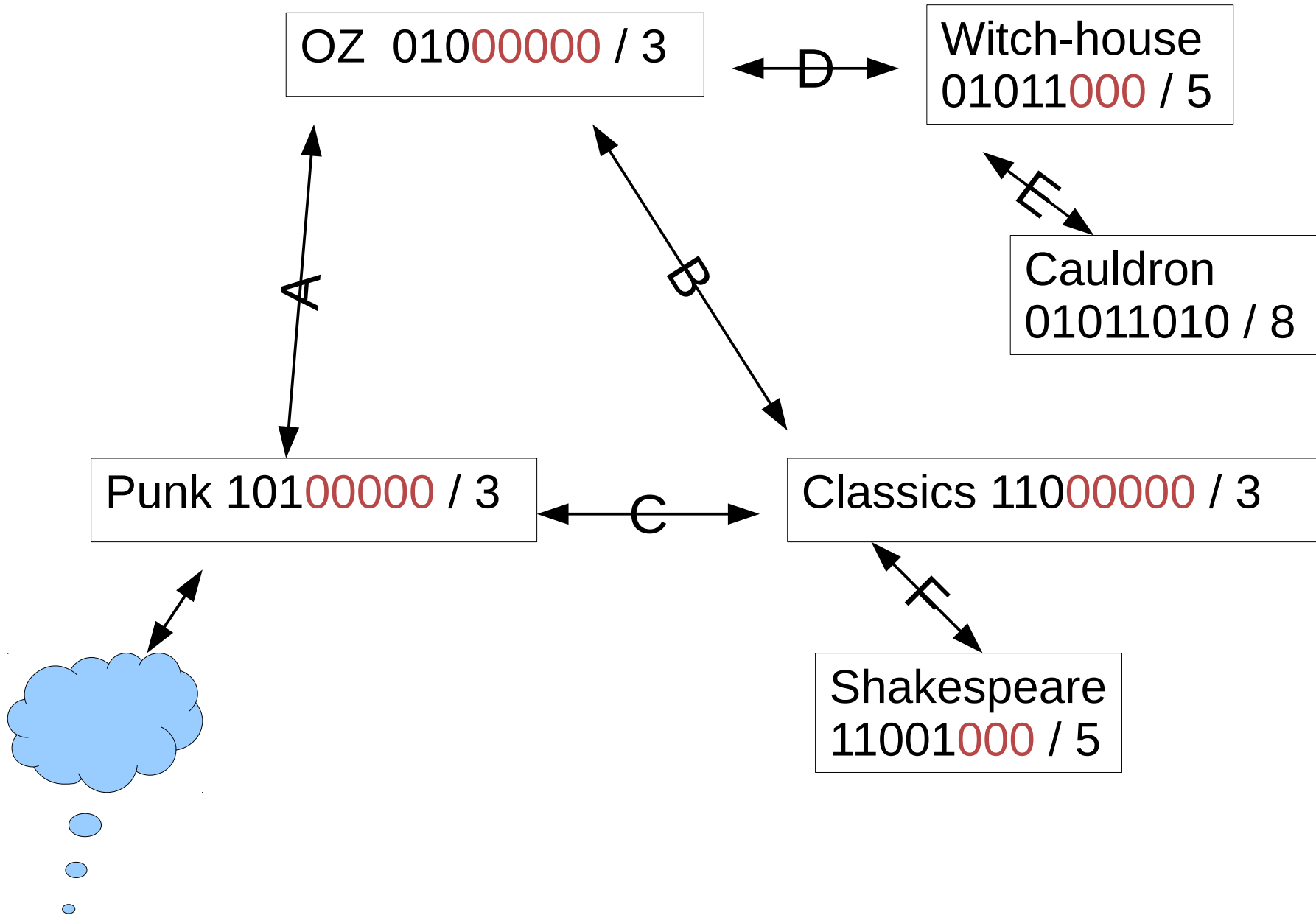
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IPV6 only diet

- Wireless essid: ipv6only
- Network: 2001:4978:21b:2::/64
- Gateway: 2001:4978:21b:2::1
- Nameserver: 2001:4de0:1000:a4::2 or 2001:4de0:1000:a3::2
- stateless address autoconfiguration
- Neighbor Discovery option Recursive DNS Server (RDNSS) rfc6106 (November 2010)

Welcome to the 8-bit net



8-bit net

- 01000000/3 OZ, is 01000001 through 01011110
- 11000000/3 Clas., is 11000001 through 11011110
- 10100000/3 Punk, is 10100001 through 10111110
- 01011000/5 Witch, is 01011001 through 01011110
- 11001000/5 Shake, is 11001001 through 11001110

OZ's routing table

- Dest: 10100001/8 Link: A (Punk)
- Dest: 10100000/3 GW: 10100001 (Punk)
- Dest: 11000001/8 Link: B (Classics)
- Dest: 11000000/3 GW: 11000001 (Classics)
- Dest: 01011001/8 Link: D (W-house)
- Dest: 01011000/5 GW: 01011001 (W-house)
- Dest: 00000000/0 GW: 10100001 (Punk)

Witch-house router, routing table

- Dest: 01011000/5 Link: E (Witch LAN)
- Dest: 01000001/8 Link: D (OZ)
- Dest: 00000000/0 GW: 01000001 (OZ)

Cauldron routing table

- Dest: 01011000/5 Link: E (Witch LAN)
- Dest: 00000000/0 GW: 01011001 (W-router)

Hexadecimal

- 0,1,2,3,4,5,6,7,8,9,A₍₁₀₎,B₍₁₁₎,C₍₁₂₎,D₍₁₃₎,E₍₁₄₎,F₍₁₅₎
- 10,11,...19,1A,1B,1C,1D,1E,1F,20,21,22...F9,FA,FB,FC,FD,FE,FF...
- 4 bits per hex nibble $2^4 = 16$, 0000-1111
- Two hex nibbles is a byte, $2 * 4 = 8$ bits
- Four hex nibbles is 16 bits
- Eight sets of 16 bits is 128

IPv6 addresses and subnets

- 2001:4978:21b:2::1
2001:4978:021b:0002:0000:0000:0000:0001
- 2001:4978:21b::/48
2001:4978:021b:0000:0000:0000:0000:0000
 $2^{48} = 281,474,976,710,656$ /48 networks
- 2001:4978:21b:2::/64
2001:4978:021b:0002:0000:0000:0000:0000
 $2^{16} = 65,536$ /64 networks per /48 network

Goodbye dotted decimal submasks

- /24 == 255.255.255.0
.e.g 192.168.0.0/ 255.255.255.0
192.168.0.1, 192.168.0.2,... 192.168.0.254
- /29 == 255.255.255.?
11111000 == 248
/29 == 255.255.255.248
208.81.1.72 / 255.255.255.248
01001000 == 72
208.81.1.73, 208.81.1.74...208.81.1.78

Basic Linux Configuration

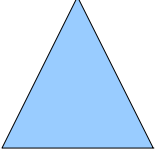
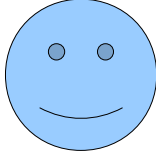

- `# ip link set eth0 up`
- `# ip addr add 2001:4978:21b:2::4/64 dev eth0`
- `# route -A inet6 default gw 2001:4978:21b:2::1`
(can be done with `ip route` as well)

Debian /etc/network/interfaces static entry:

```
auto eth0
iface eth0 inet6 static
address 2001:4978:21b:2::4
netmask 64
gateway 2001:4978:21b:2::1
```

How to get everyone on the diet

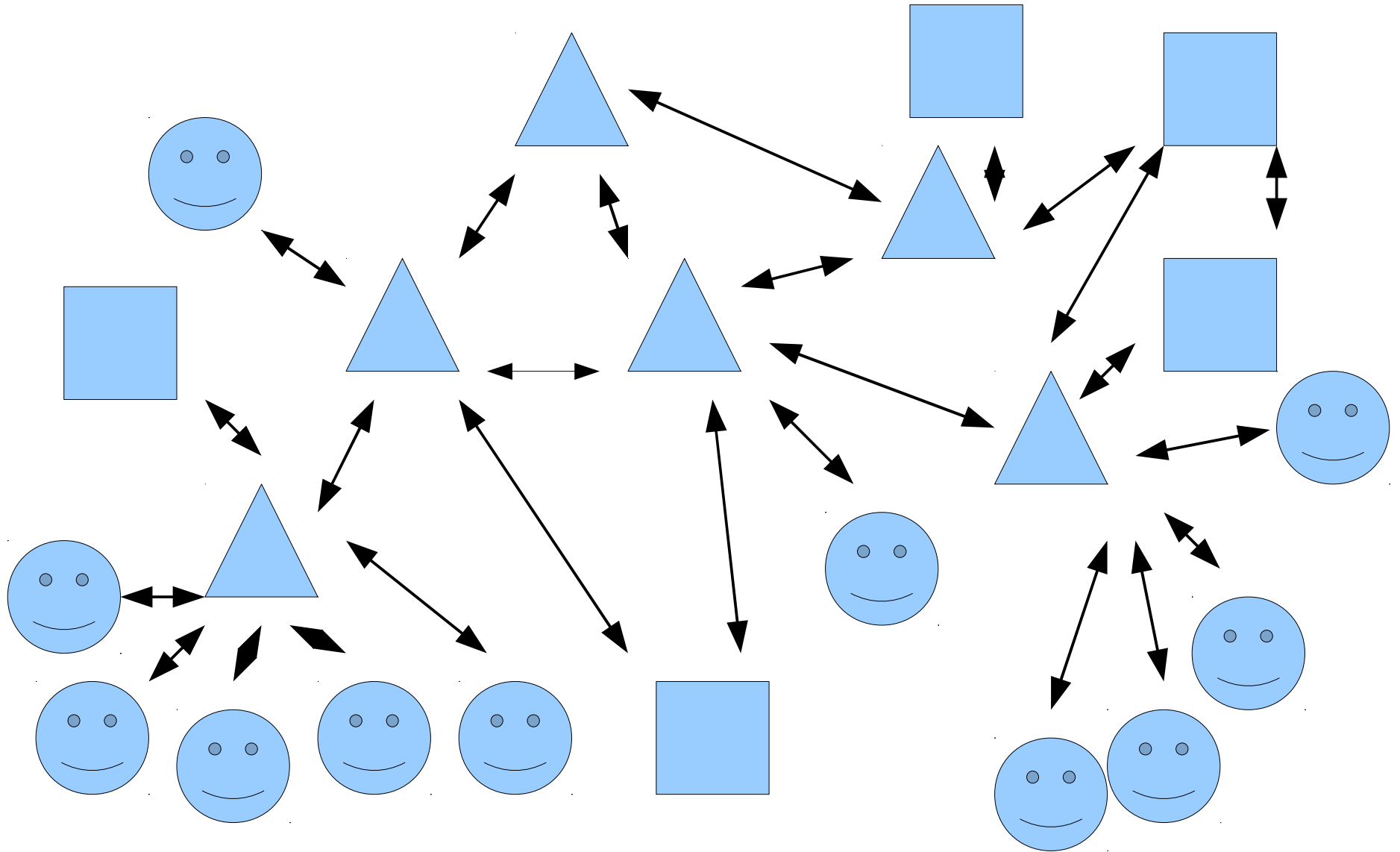
An over-simplified transition plan

- Telecoms 
- Internet service consumers 
- Internet service producers 

Telecom offerings

- Real IPV4 address
- Private IPV4 address
- Real IPV6 addresses

Only the service producers need to go dual stack



/etc/radvd.conf

```
interface eth0
{
    AdvSendAdvert on;
    prefix 2001:4978:21b:2::/64
    {
    };
    RDNSS 2001:4de0:1000:a4::2 {
    };
};
```

Reverse DNS

```
$ dig -x 2001:4978:21b:2::1
```

```
:: QUESTION SECTION:
```

```
;1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.2.0.0.0.b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa. IN PTR
```

```
:: ANSWER SECTION:
```

```
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.2.0.0.0.b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa. 3600 IN PTR  
ipv6.parit.ca.
```

BIND Zone entry

```
zone "b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa" {  
    file "b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa.db";  
    type master;  
};
```

b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa.db

; reverse allocations for 2001:4978:21b/48
\$ORIGIN b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa.

; for 2001:4978:21b:2::/64

1.0.2.0.0.0	PTR	ipv6.parit.ca.
2.0.2.0.0.0	PTR	yo.parit.ca.
3.0.2.0.0.0	PTR	hi.parit.ca.
....		
9.0.2.0.0.0	PTR	go.parit.ca.
0.1.0.2.0.0.0	PTR	ya.parit.ca.
1.1.0.2.0.0.0	PTR	ah.parit.ca.

\$ORIGIN keyword

; reverse allocations for 2001:4978:21b/48
\$ORIGIN b.1.2.0.8.7.9.4.1.0.0.2.ip6.arpa.

; for 2001:4978:21b:2::/64
\$ORIGIN 2.0.0.0

\$ORIGIN 0.0.0.0.0.0.0.0.0.0.0.0.0

1.0 PTR ipv6.parit.ca.

2.0 PTR yo.parit.ca.

3.0 PTR hi.parit.ca.

....

9.0 PTR go.parit.ca.

0.1 PTR ya.parit.ca.

1.1 PTR ah.parit.ca.

?

Goodnight

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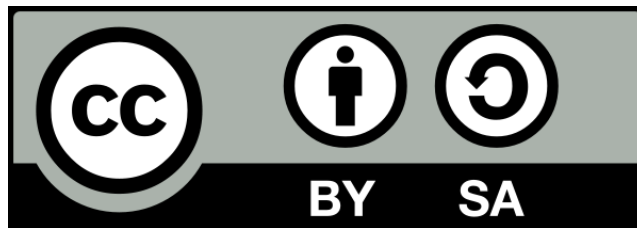
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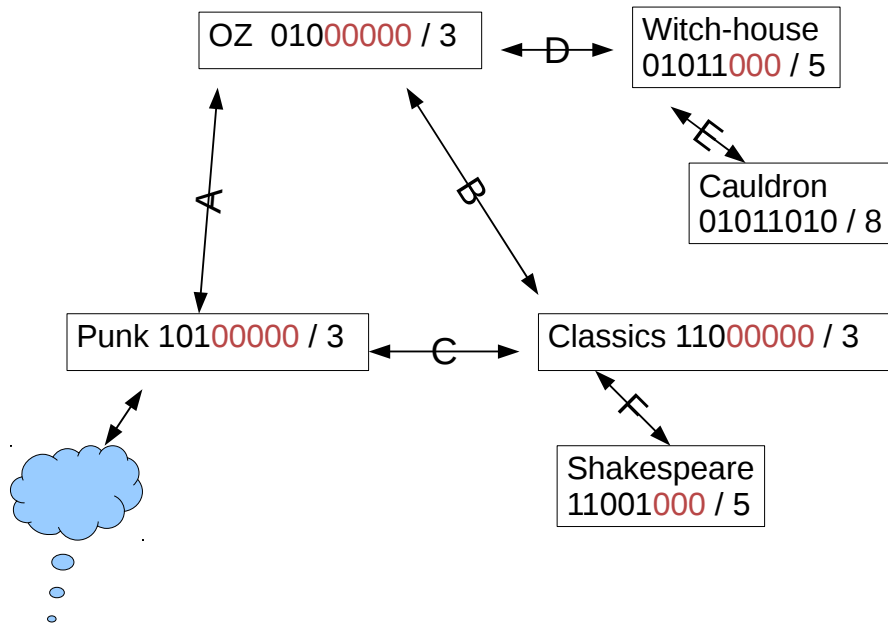
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


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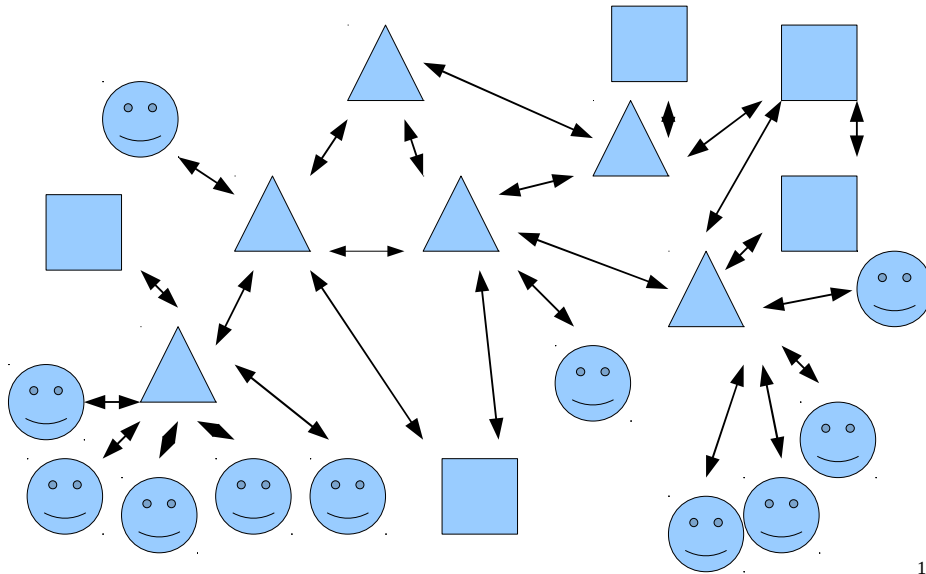
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\$ORIGIN keyword

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$ORIGIN b.1.2.0.8.7.9.4.1.0.0.2.ipv6.arpa.
```

```
; for 2001:4978:21b:2::/64  
$ORIGIN 2.0.0.0
```

```
$ORIGIN 0.0.0.0.0.0.0.0.0.0.0.0.0.0
```

```
1.0 PTR ipv6.parit.ca.
```

```
2.0 PTR yo.parit.ca.
```

```
3.0 PTR hi.parit.ca.
```

```
....
```

```
9.0 PTR go.parit.ca.
```

```
0.1 PTR ya.parit.ca.
```

```
1.1 PTR ah.parit.ca.
```

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