The Mystery of Time in Distributed Systems

Part IV

Cloudflare DNS outage due to leap second

① DNS resolutions failed → bug in CNAME lookup code.
② Outage lasted for 90 minutes → midnight UTC 01 Jan 2017

CloudFlare DNS

DNS service is used in two ways –
① IP addresses associated with names.
example.com → 192.0.2.123

② CNAME
example.com → origin-server.example-hosting.biz
→ To figure out IP address of origin server, cloudflare use recursive DNS.
① internal DNS resolvers look up DNS records from internet
② RRDNS talks to resolvers to get IP address

weighted selection
RRDNS chooses most performant resolver by tracking internal resolvers performance.

→ weighted selection code runs on assumption that time can't go backwards.

```
rtt := time.Now().Sub(start)
```

if start > time.Now() – value is negative during leap second
↓
this value is passed to Go
rand.Int63n() panic

↑ don't take -ve numbers.

Code fix

```
if ( rtt == 0)
{
  rtt = defaultTimeout
}
```

→

```
if (rtt <= 0)
{
}
```

Dealing with leap seconds

↳ Leap smearing → NTP should distribute additional second before 12 hrs and after 12 hrs the second is to be introduced. noon to noon UTC

↳ supported by cloud providers like AWS.

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