



Getting Started with Kea

Webinar: 08 June 2016

Logistics

- Webinar is scheduled for 1 hour
- This session will be recorded and posted at <http://www.isc.org/webinars>
- Participants are muted to improve audio quality for everyone.
- We want questions! Please enter into the WebEx Q&A tab
 - The presenter may defer some questions until the end of the presentation

Presenters



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Why Kea?

- ISC DHCP is now 21 years old
- Stable, effective, but...
 - Slow by modern standards
 - Flat file lease storage
 - Restarts likely required for config mods
 - Failover only in peer arrangements
 - Oh, those man pages!

Kea

- DHCP server
- C++
- modern alternative to ISC DHCP
- standards-compliant
- open-source
- DHCPv4 & DHCPv6
- easily extensible (via Hooks)

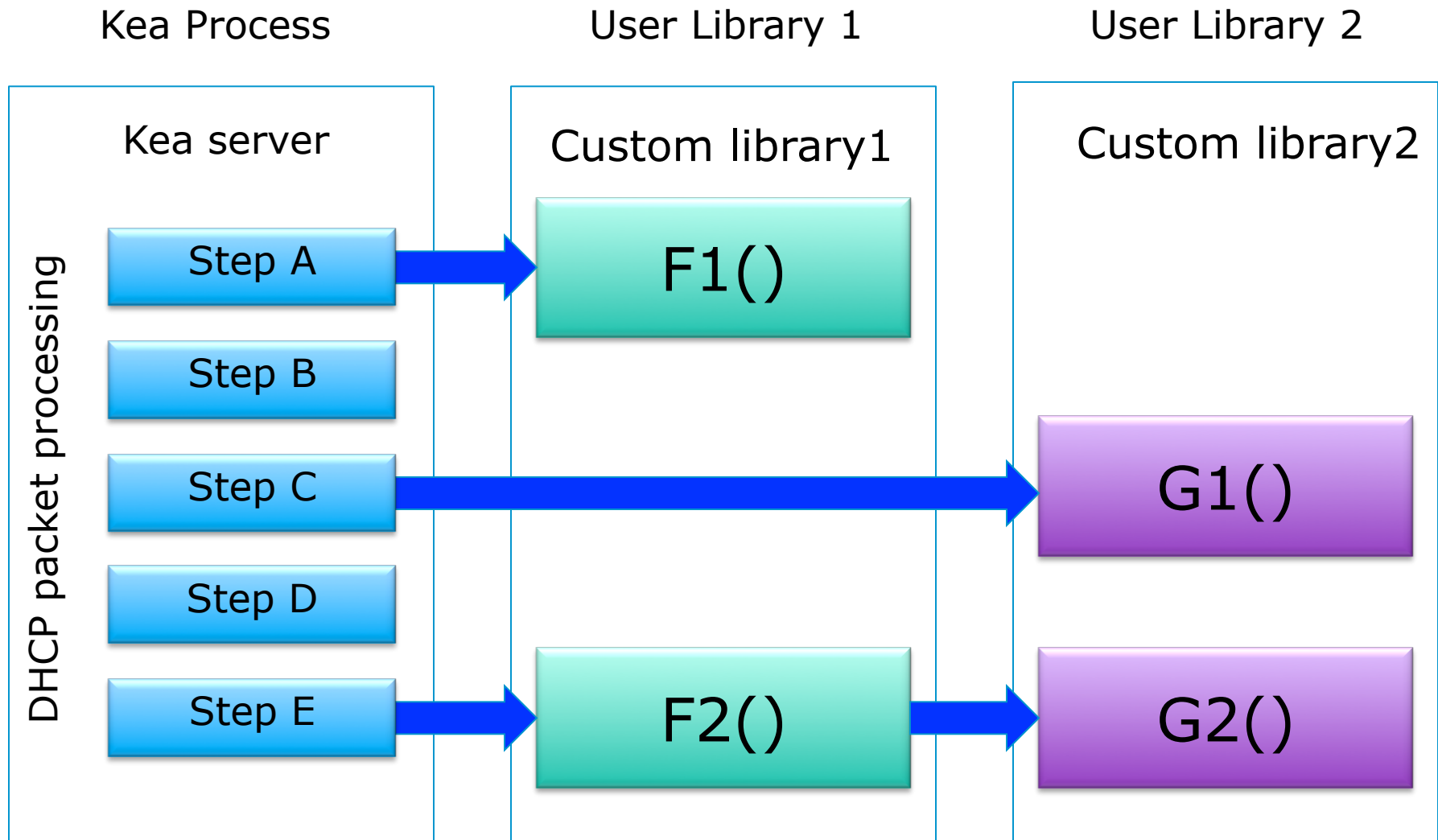
Kea

- Better performance
- Ability to store lease information in a database
- No restart required unless physical interfaces change
- Well-documented

Kea Hooks

- Dynamically Loadable Libraries
- Written in C++
- Functions given control at points in packet processing
- Can access **all** parts of Kea

Hooks :: Extending the Server



For more about kea hooks

29 June 2016

Webinar: Extending Kea with Hooks
with Marcin Siodelski, Kea Software
Engineer

<https://www.isc.org/events/webinar-extending-kea-with-hooks/>

stateless / anycast DHCP!?

- Kea can store lease info in a database (MySQL, PostgreSQL, more to come)
- Multiple Kea servers can speak to the same DB
- DHCP Failover may no longer be painful!!!
Instead of failover pairs, we can have many servers. We can even have them answering on the same address.

Kea installation options

- Build from Kea source
- Install pre-built Kea from an OS packager of your choice
 - RedHat
 - CentOS
 - Debian
 - Arch
 - Fedora

Kea source installation requirements

- g++
- make
- boost (C++ libraries)
- Crypto library (OpenSSL or Botan)
- log4cplus

Download Kea source tarball from
www.isc.org

Kea source installation

Once unzipped & untarred:

- `./configure`

(configure options you may consider: `--prefix`, `--with-dhcp-pgsql`, `with-dhcp-mysql`, `--with-openssl`, `--with-botan-config`)

- `make`
- `make install`

Default config file!

- Default location is `/usr/local/etc/kea`
 - `kea.conf`

```
# This is a basic configuration for the Kea DHCPv4 and DHCPv6 servers.  
# Subnet declarations are commented out and no interfaces are listed.  
# Therefore, the servers will not listen or respond to any queries.  
# The basic configuration must be extended to specify interfaces on  
# which the servers should listen. Also, subnets and options must be  
# declared.
```

Starting Kea directly

```
# /usr/local/sbin/kea-dhcp4 -c /usr/local/  
etc/kea/kea.conf
```

```
# /usr/local/sbin/kea-dhcp6 -c /usr/local/  
etc/kea/kea.conf
```

keactrl

- config file also located in `/usr/local/etc/kea` by default

```
# This is a configuration file for keactrl script which controls  
# the startup, shutdown, reconfiguration and gathering the status  
# of the Kea's processes.
```

```
# Start DHCPv4 server?  
dhcp4=yes
```

```
# Start DHCPv6 server?  
dhcp6=yes
```

keactrl

```
# /usr/local/sbin/keactrl start
```

```
# /usr/local/sbin/keactrl status
```

```
DHCPv4 server: active
```

```
DHCPv6 server: active
```

```
DHCP DDNS: inactive
```

```
Kea configuration file: /usr/local/etc/kea/kea.conf
```

```
keactrl configuration file: /usr/local/etc/kea/  
keactrl.conf
```

keactrl

```
# /usr/local/sbin/keactrl stop
```

```
#/usr/local/sbin/keactrl reload
```

```
INFO/keactrl: Reloading kea-dhcp4...
```

```
INFO/keactrl: Reloading kea-dhcp6...
```

Kea Configuration

- File location
- Interfaces
- Lease database
- Subnets and pools
- DNS information
- Lease lifetimes
- Logging
- Host Reservations

Kea Configuration

- Kea's configuration file is in JSON format
- In addition to the default config file, several example configs can be found in each installation. Check the kea4, kea6 and ddns directories under:

[install-dir]/doc/examples/

Kea config: defining interfaces

This is an example configuration file for the DHCPv4 server in Kea.
It is a basic scenario with one IPv4 subnet configured. The subnet
contains a single pool of dynamically allocated addresses.

```
{ "Dhcp4":  
  
{  
# Kea is told to listen on ethX interface only.  
  "interfaces-config": {  
    "interfaces": [ "eth0", "eth3" ]  
  },  
  
}
```

Kea config: defining the lease database

We need to specify lease type. 3 backends are currently supported:
memfile, mysql and pgsq.

```
"lease-database": {  
  "type": "memfile"  
},
```

-Or-

```
"lease-database": {  
  "type": "postgresql",  
  "host": "pgsql-server.example.com",  
  "name": "keadatabase",  
  [credentials snipped...]  
},
```

Kea config: defining subnets and pools

The following list defines subnets. We have only one subnet
here. We tell Kea that it is directly available over local interface.

```
"subnet4": [  
  {  
    "pools": [ { "pool": "192.0.2.10 - 192.0.2.200" } ],  
    "subnet": "192.0.2.0/24",  
    "interface": "eth0"  
  }  
]  
,
```

Kea config: supplying DNS servers to clients

Defining a subnet.

```
"subnet4": [  
  {  
    "pools": [ { "pool": "192.0.2.10 - 192.0.2.200" } ],  
    "subnet": "192.0.2.0/24",  
    "interface": "eth0",  
    "option-data": [  
      {  
        "name": "domain-name-servers",  
        "data": "192.0.2.1, 192.0.2.2"  
      }  
    ],  
  ]  
]
```

Kea config: lease lifetimes

```
# Addresses will be assigned with valid lifetimes being 4000. Client  
# is told to start renewing after 1000 seconds. If the server does not respond  
# after 2000 seconds since the lease was granted, client is supposed  
# to start REBIND procedure (emergency renewal that allows switching  
# to a different server).
```

```
  "valid-lifetime": 4000,
```

```
# Renew and rebind timers are commented out. This implies that options  
# 58 and 59 will not be sent to the client. In this case it is up to  
# the client to pick the timer values according to RFC2131. Uncomment the  
# timers to send these options to the client.
```

```
# "renew-timer": 1000,
```

```
# "rebind-timer": 2000,
```

Kea config: logging

The following configures logging. It assumes that messages with at least
informational level (info, warn, error) will be logged to a file.

```
"Logging": {  
  "loggers": [  
    {  
      "name": "kea-dhcp4",  
      "output_options": [  
        {  
          "output": "/var/log/kea.log"  
        }  
      ],  
      "severity": "INFO"  
    }  
  ]  
}
```

Kea config: logging

- Note that multiple loggers are available
- This allows for higher logging levels for different components
- Currently defined loggers:

kea-dhcp4, kea-dhcp4.ddns, kea-dhcp4.bad-packets (DHCPNAK), kea-dhcp4.options, etc. etc.

Full list at: <http://kea.isc.org/docs/kea-guide.html#logging>

Kea config: defining host reservations

```
# Define a subnet with a reservation for 192.0.2.199
"subnet4": [
  {
    "pools": [ { "pool": "192.0.2.10 - 192.0.2.200" } ],
    "subnet": "192.0.2.0/24",
    "interface": "eth0",
    "reservations": [
      {
        "hw-address": "1a:1b:1c:1d:1e:1f",
        "ip-address": "192.0.2.199"
      }
    ],
  }
]
[...]
```

References

- kea.isc.org
- <http://kea.isc.org/docs/kea-guide.html>
- <https://lists.isc.org/mailman/listinfo/kea-users>
- <http://kea.isc.org/wiki/Install> (OS package list)
- <https://kb.isc.org/article/AA-01381/0/Kea-1.0-Quick-Start-Guide.html>



Thank You!

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General Q&As

Q. Does kea support to configure both ipv4 and ipv6 client/server/relay on interface simultaneously ?

Kea includes only a server, there is no client or relay in the Kea distribution (yet). Yes, you can configure both an IPv4 and IPv6 server to listen on the same interface.

Q. Is there an easy way to specify non-standard DHCP options easily? That was a huge pain with ISC DHCP...

One needs to specify the code (easy) and the types of the values (not so easy). You specify option formats in the configuration. Given that there are many different formats possible, the definition of the option format requires a few parameters

Roadmap Q & As

Q. What is ISC's roadmap for ISC DHCP vs Kea? Is the latter going to be preferred over time and the former deprecated down the road?

Yes. We have not yet announced an end of maintenance for ISC DHCP, but that day is on the horizon. We are currently developing a version 4.4, which we expect will be the last release with new features in it. It is increasingly difficult to add new features, and even to fix bugs, in ISC DHCP. That is the main motivation for writing Kea.

Q. Do you know of any commercial vendors who have integrated ISC-DHCP switching to Kea?

Men and Mice did a public webinar earlier this year in which they disclosed they plan to ship support for Kea in late summer of 2016.

Host Reservation Q & As

Q. can the preassigned reservations be specified in the database as opposed to the config file?

Yes, it is already possible with Kea 1.0, but it has its limitations. In Kea 1.0 you can do this only with MySQL and DHCPv4. In Kea 1.1 we will also support DHCPv6 and Postgres. Also, in Kea 1.0 you can't assign host specific options. In Kea 1.1.0 we will cover all missing features for Host Reservations in the database (MySQL and Postgres)

DDNS Q&A

Q. Any improvements on the DDNS side ? Will Kea still stop delivering leases in case the DNS server is not available to sent the DNS update ?

The server will pass the updates to the Kea DDNS module. If that module can't talk to the DNS server the updates are not performed but leases are granted and the client gets its configuration from the DHCP server.

Q. Can Kea still push dynamic updates to BIND (or other DNS servers) in cases where "true" dynamic DNS (e.g. from the client) is not desired?

Both Kea and ISC DHCP allow you to update the DNS using either the name the client sends or to change the name to something specified on the DHCP server.

Migrating Q&As

Q. Is there a migration guide/tips available in going from ISC DHCP to Kea?

We are planning to work on a migration utility, but we haven't got it yet. At the moment, Kea has a subset of all the features in ISC DHCP. Until Kea 1.1, Kea has limited client classification capabilities, we are waiting to get full client classification before tackling a migration utility.

Q. Is there away to generate the DNS TXT record?

No. Kea DDNS only writes DHCID records and conflict detection is always enforced. This is the standardized way. ISC DHCP will generate both DHCID and TXT records. If this is a migration question about migrating from ISC DHCP to Kea, the right path is probably ISC DHCP using TXT -> ISC DHCP using DHCID -> Kea using DHCID

Database Q&As

Q. Will you support REDIS db ?? Q. Any plans to support Oracle DB?
We don't have plans to add other database backends ourselves at this point. However, we encourage people to make contributions. The PostGres backend was contributed, and we have another team working on a Cassandra back end contribution now. We will may have to limit the number of DBs we support for resource reasons.

Q. Is there any limitation about db configuration? For example, single/master-slave MySQL may be supported, but MHA or MySQL Cluster may not be supported, and so on.

We are testing both Master-Master and MySQL cluster now to document the configuration and determine if there are limitations. There are so many variants possible, even just in terms of MySQL editions available, we won't be able to document them all, this is a great area for community collaboration.

HA Q&As

Q. Can Kea scale to N nodes (> 2) for HA vs the 2 in DHCPv4 failover? If so, what are the implications of doing so if any?

Kea does **not** support DHCPv4 failover (which ISC DHCP supports.). We believe that HA implementations can be achieved in production using a HA database backend. One of the primary benefits of this is, you should be able to achieve N+1 redundancy, which would be superior to the pair—wise failover of DHCPv4 failover. (There is no standard for DHCPv6 failover.)

We are currently testing an HA MySQL configuration and will publish the results of the test when we are finished. This is an area where we welcome collaboration from those users with significant MySQL or Postgres expertise.

Leases Q&A

Q. What's the significance of "mem" in "memfile" ? Is it a file in the file system, or something more volatile ?

“memfile” means leases are held in memory and file. While the server works and has loaded all leases from file it keeps leases in memory so the updates and such are fast, but they are written to disk. (you *can* disable writing to disk if you want to, but then the lease information is gone if the server crashes or restarts)

Hooks Q & As

Q. Is there a way to write hooks in other languages? Scripting languages like Python or Lua would be a great convenience. Is this in a roadmap?

We have considered other languages (including Python), but we put this on hold in favor of other critical features. We should get there at some point but it is not scoped for a release yet.

Q. Can we have a hook that generates responses for reservations? In our case we are interested in a config that associates options with IPv6 Prefix Delegations (each PD should have specific options).

And we have many-many prefixes ;-)

Yes, you'd need to do it via hook. We don't have such a hook in place, but it is implementable. Of course, the hook would need to talk to the source of information where such PD/options associations are held.

Hooks Q&As

Q. Are there hooks inside lease selection, so that you can affect it without completely replacing it ?

Yes, you can modify a selected lease.

Performance Q&As

Q. How many leases a second can Kea serve?

It depends, somewhere between 300 and 7000 in our tests, mostly depending on the backend used. Memfile is fastest, followed by Postgres, MySQL is slowest. We are doing performance testing, varying pool size, pool utilization, protocol (v4/v6) and backend and we do plan to publish some performance test results, once we have results we are confident of.

Q. Does Kea benefit from multi-thread or multi-process?

Kea uses multiple separate processes (DHCPv4, DHCPv6, D2 (Kea DDNS), and Lease File Cleanup processes. It is not multi-threaded.