



## What is Kea?

#### And why you may want to use it





## If you never heard about Kea...

- Modern DHCPv4 and DHCPv6 server (1.0 in Dec 2015)
- Performance (1000s leases/sec)
- Scalable (millions of devices)
- No restarts after config changes
- Databases (CSV, MySQL, PostgreSQL, Cassandra)
- Hooks (3<sup>rd</sup> party libraries)
- REST management API
- Linux, BSDs, MacOS, ...
- Open source (MPL2)
- 1.2.0 just released (28 April 2017)





# Let's compare!

	ISC DHCP	ISC Kea
Started	prehistory (1995)	Recent (2011)
Code	Not adding anything big	Active development with tons of new features
Code repository	Internal, tarball published	github
Bug database	Internal, mail external	public trac
Testing	~30 unit-tests	4000+ unit-tests Memory leak tests (valgrind) 700+ system tests Fuzz testing
Docs	Man pages	User's Guide (100+ pages) Developer's Guide
Logs	Fixed log message	Every possible log entry is documented and described
IPv6 readiness	IPv4 originally, IPv6 added later	IPv4 optional



# Why migrate from ISC DHCP?

	ISC DHCP	ISC Kea
Performance	Ok (with ramdisk tricks)	Great (many 1000s leases/sec)
Management	OMAPI (custom C interface)	JSON over REST API/http, JSON over Unix socket
Extensibility	Shell scripts (out only), configuration language	<b>JSON</b> everywhere, <b>Hooks</b> (C++), stable API
Configuration	Custom complex syntax (almost programming language)	<b>JSON with optional DB storage</b> for some elements (more to come)
Leases information	Custom	CSV, MySQL, PgSQL, Cassandra
Hosts information	Custom config	JSON, MySQL, PgSQL

### Cool features :: DB

- Leases, host reservations in DB
  - CSV
  - MySQL or PostgreSQL
  - Cassandra\*
- SQL data can be modified any time
- All changes applied instantly (no restart)
- Can fiddle with the DB directly or
- Use host commands (1.2) or subnets (1.3)



CSV





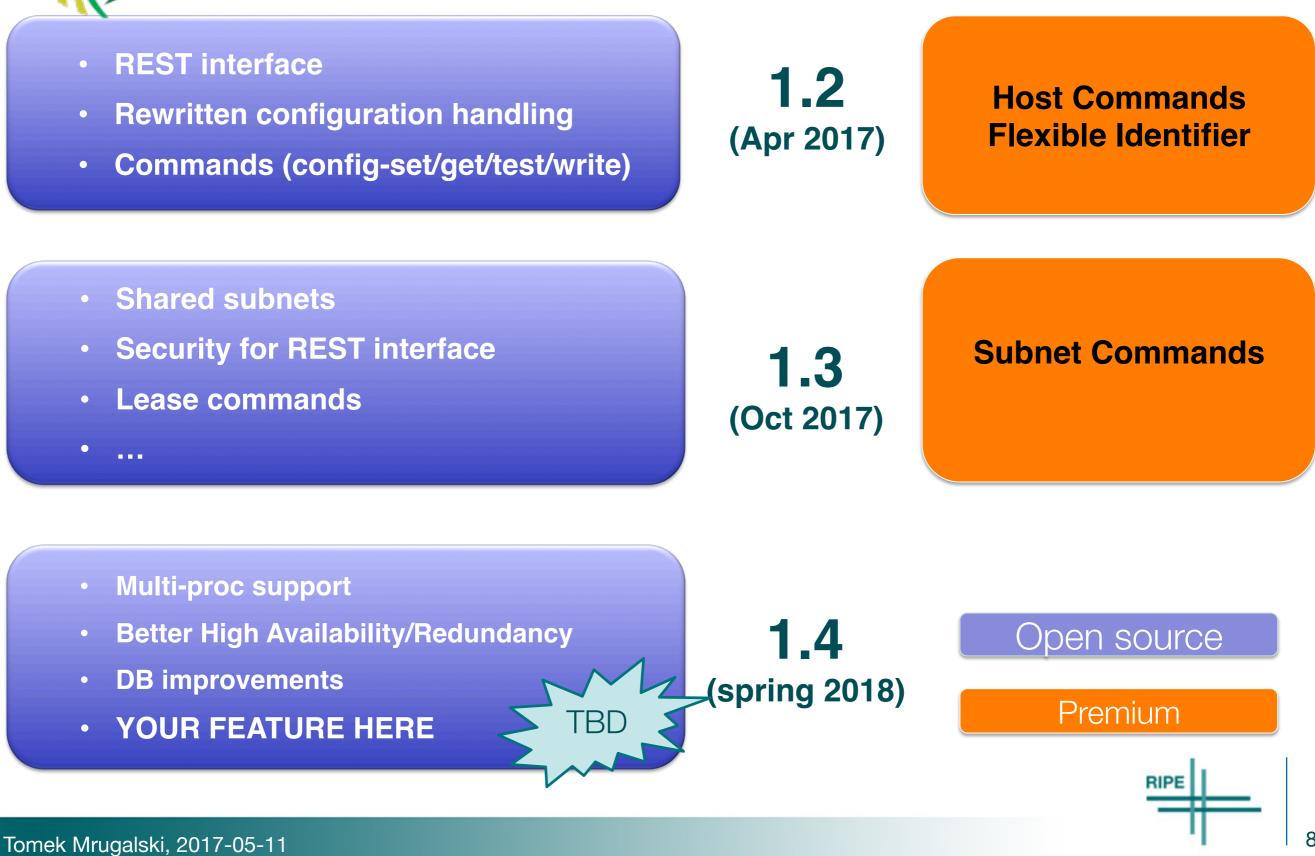


- Command Channel (Unix socket, since 0.9.2)
- REST interface (http, since 1.2.0)
- JSON commands, JSON responses
  - kea-shell provided (python 2.x, 3.x example)
  - Trivial to use from any JSON/http capable env
- Commands:
  - config-get, config-set, config-test, config-write
  - reservation-get, reservation-add, reservation-del\*
  - statistic-get, statistic-reset, statistic-get-all, statistic-reset-all, ...
  - leases-reclaim, list-commands, shutdown, version-get, build-report
- More to come every release





### Kea Roadmap





### Cool features :: Hooks

Facebook datacenter running on Kea

## **Open Source and Sustainability**

How to properly fund OS?





# Commercial quality software

- A small team (2 full time, with 2 more contributing) of experienced engineers
- A real, independent QA
  - 4000+ unit-tests, 700+ system tests
  - Run on ~20 systems
  - Valgrind, Coverity scan, other static analyzers
- Proper designs
  - Written Requirements, Designs, Implementation, Testing
- Very well documented
  - User's Guide (100+ pages, ~40 example configs)
  - Developer's Guide (code is well commented, all params documented)



# Funding so far

- In development since 2011
- Had several custom development contracts
- Two sponsors (Comcast and Mozilla, thanks!)
- Very few support customers
- Sporadic personal contributions (thanks!)

But...

Most of the work was internally funded by ISC

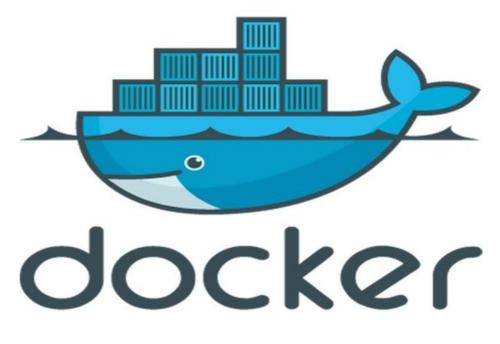






## Funding Idea #1: Kea 1.2.0 Docker

- Docker image with Kea + MySQL pre-configured
- Easy to deploy
- An experiment





## Funding Idea #2 : Premium features

- Kea is and will remain open source (MPL2, 478KLOC)
  - Provides support for hook libraries (~Apache module)
  - API is open (3<sup>rd</sup> party hook libs appearing now)
- Premium (EULA, 6.8KLOC)
  - Additional extra features
  - targeted for large deployments
  - A way to convince people to sign support contract
  - Yes, support contract = \$

#### isc.org/blogs/funding-kea/



## Existing & Planned Hooks

- User\_chk example access control (open source)
- Forensic Logging detailed audit trail for legal purposes
- Flexible Identifier identify hosts by expression, e.g. concat(relay4[2].hex, relay4[6].hex)
- Host Commands query, add and delete host reservations using REST interface
- 1.3
- Subnet management (add, get, update, delete)
- Extra lease commands (add, get, update, delete)

Open source







### Hook Example

Apply a display filter ... <Ctrl-/>

Go Capture

View

Edit

No.	Time	Source	Destination	Protoco
	1 0.000000	10.254.139.1	10.253.181.250	DHCP

Analyze Statistics Telephony Wireless

Tools

#### Flexible Identifier

#### How to identify hosts:

#### **Open source**

• MAC, duid, circuit-id, client-id

#### Premium

- Almost anything could be used (35 different expressions)
- Options (client, relay, vendor)
- Fixed fields
- Concat, substring
- Meta-data (interface name, src/dst IP, ...)

Message type: Boot Request (1) Hardware type: Ethernet (0x01) Hardware address length: 6 Hops: 1 Transaction ID: 0x21fc01f8 Seconds elapsed: 0 Bootp flags: 0x0000 (Unicast) Client IP address: 0.0.0.0 Your (client) IP address: 0.0.0.0 Next server IP address: 0.0.0.0 Relay agent IP address: 10.254.139.1 Client MAC address: ArrisGro\_29:97:d0 (74:56:12:29:97:d0) Client hardware address padding: 0000000000000000000 Server host name not given Boot file name not given Magic cookie: DHCP Option: (53) DHCP Message Type (Discover) Option: (60) Vendor class identifier Option: (0) Padding Option: (61) Client identifier Option: (125) V-I Vendor-specific Information (43) Vendor-Specific Information (CableLabs) Option: (55) Parameter Request List Option: (82) Agent Information Option Length: 25 Option 82 Suboption: (1) Agent Circuit ID Option 82 Suboption: (2) Agent Remote ID Option 82 Suboption (9) Vendor-Specific Information Option: (255) End 27 01 01 2b 82 02 03 45 00 25 01 01 26 02 00 4 .%..&..@ '..<mark>+</mark>.. 18 33 34 34 37 35 38 30 91c0 03 03 45 43 4d 04 .ECM. .344758 35 30 31 30 31 32 30 31 01d0 36 30 39 30 37 32 3609072 5010120 03 35 2e 30 06 1d 53 42 5f 4b 4f 4d 4f 4 01e0 .5.0.. SB KOMO 01f0 4f 2d 31 2e 30 2e 36 2e 31 30 2d 53 43 4d 30 30 )-1.0.6. 10-SCM0 53 50 55 2d 42 0200 4f 53 48 07 1c 50 2d 4e NOSH..P SPU-Boo 31 2e 30 2e 31 0210 28 32 35 43 4c 4b 29 20 25CLK) 1.0.12 38 6d 33 08 06 30 30 32 30 34 30 09 06 53 42 36 0220 3m3..002 040..SB Bootp/Dhcp option type (bootp.option.type), 132 bytes

concat(relay4[1].hex, relay4[2].hex)





## Funding Idea #3 : Kittiwake GUI

- REST interface
- Focusing on typical ops first:
  - Monitor pool utilization
  - Add/delete host reservations
- Distribution/Licensing TBD
  - Freemium?
  - Paid app?
  - Extra benefit for customers?
- 1.0 planned in Autumn 2017
- Get in touch! We'll be looking for beta testers/your requirements

Import DHCP conf	iguratio	n
id:	1	Subnet identifier
interface:		This subnet is selected for DHCP requests received on this interface
reservation-mode:	all	Defines whether in-pool, out of the pool or both types of reservations are sup
renew-timer:	900	Number of seconds since last lease renewal after which the client should ren
rebind-timer:	1800	Number of seconds since last successful lease renewal after which the client unsuccessful
valid-lifetime:	4000	Lease lifetime

Create new reservation		×
DHCP identifier type		
Select type		
DHCP identifier		
e.g. A0:B1:C2:D3:E4:F5		
Hostname		
e.g. crane.example.org		
IPv4 address		
e.g. 192.0.2.3		
	Close	Save changes

Subnet	10.20.30.0/29					
Subnet information	tion DHCP	Reservations	Statistics DHC	CP leases		
IP address us	age in the subne	t				
generated: 17:4	7:57					
						All
						Available
						Assigned
						<ul><li>Assigned</li><li>Reserved</li></ul>
						<ul><li>Assigned</li><li>Reserved</li><li>Declined</li></ul>
						<ul><li>Assigned</li><li>Reserved</li></ul>



#### Funding Idea #4: ISC DHCP to Kea migration

- Migration tool is in development
- ISC DHCP config is complex (80% cases)
- Trials will start soon
- Interested?
  - We're looking for configuration samples
  - Talk to us
- Revenue model TBD





Your thoughts on those ideas?

Questions?

Suggestions?

