MQTT as a Unified Message Bus for Infrastructure Services

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https://github.com/mtreinish/firehose/tree/lca2018

The problem

- The OpenStack community infrastructure operates >40 services on >250 servers
- Some services depend on automation from
- Several user facing services expose event buses

OpenStack Community Infrastructure Firehose

- An MQTT broker for the OpenStack community infrastructure
- Has anonymous, read-only access via MQTT on 1883/tcp
- SSL/TLS MQTT also available on 8883/tcp
- Websockets supported (but temporarily disabled)

MQTT

- Pub/sub messaging protocol
- Formerly MQ Telemetry Transport
- ISO/IEC 20922
- Protocol dates back to 1999
- Lightweight design, low bandwidth
- Popular in IoT and sensor network applications
- Large application ecosystem

MQTT Clients

- ▶ Bindings available for most languages
- ▶ https://github.com/mqtt/mqtt.github.io/wiki/libraries
- ▶ Eclipse Paho project provides similar interfaces across multiple languages

MQTT Brokers

- ▶ Centralized broker
- ▶ Many different options: https://github.com/mqtt/mqtt.github.io/wiki/servers

MQTT Topics and Subscriptions

- ▶ Topics are generated dynamically
- ▶ Topics are heirarchical
- ▶ Supports wildcarding

Examples:
sensors/*HOSTNAME*/temperature/*HDD_NAME*

- ▶ sensors/sinanju/temperature/nvme0n1p1
- ▶ sensors/+/temperature/+
- ▶ sensors/sinanju/temperature/+
- ▶ sensors/sinanju/#

The Firehose

- Runs Mosquitto MQTT broker
- Single broker instance
- **Hardware Specs:**

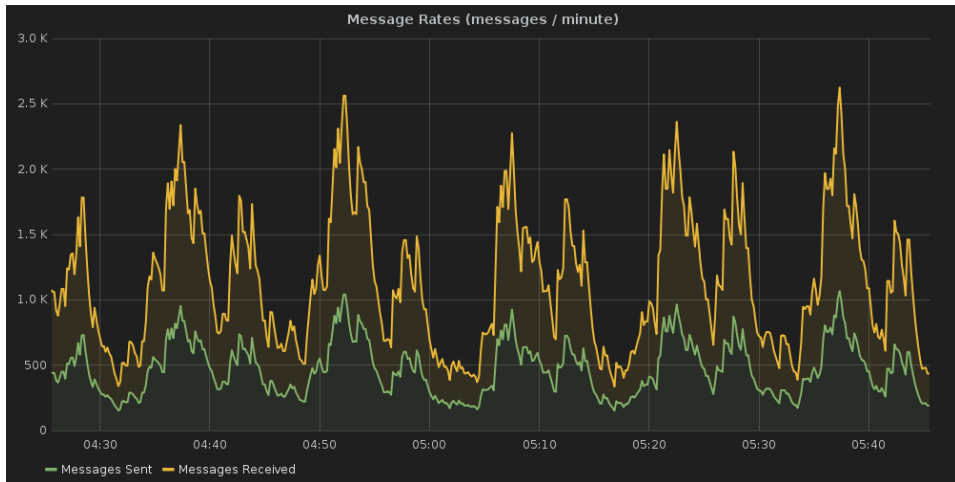|	
vCPUs	2
CPU Frequency	2.6 GHz
RAM	2 GB
swap	0 B
Disk	40 GB
Bandwidth	200 Mbps

Mosquitto

- ▶ MQTT broker implemented in C
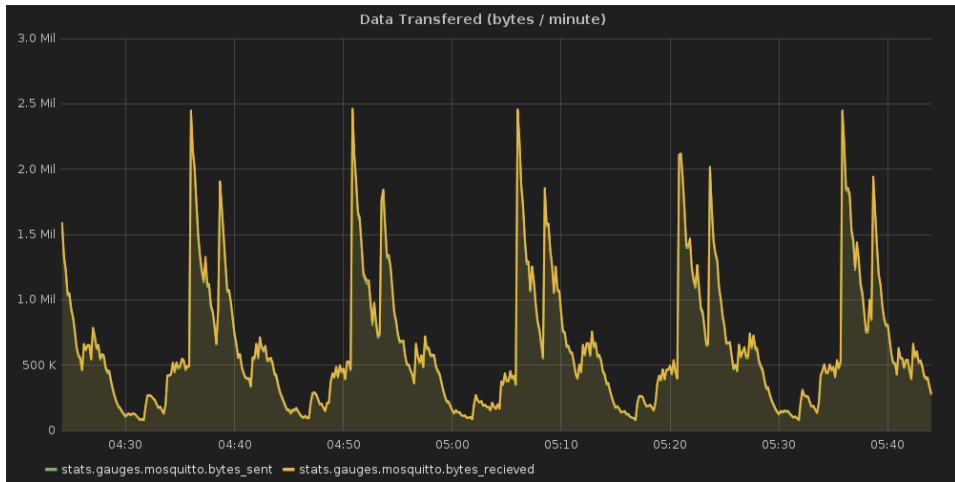- ▶ An Eclipse IoT project
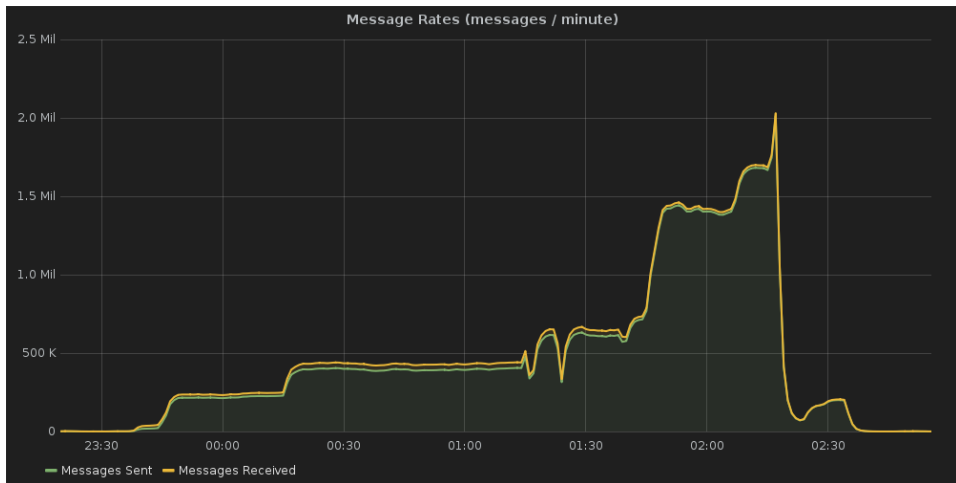- ▶ Support for MQTT v3.1 and v3.1.1

Services Using the Firehose

Service	Base Topic	Source of Messages
Ansible	ansible	Ansible MQTT Callback Plugin
Gerrit	gerrit	germqtt
Launchpad	launchpad	lpmqtt
Subunit Gearman Worker	gearman-subunit	subunit-gearman-worker
Logstash Workers	gearman-logstash	logstash-gearman-worker

Typical Firehose Load

Data Transfered (bytes / minute)

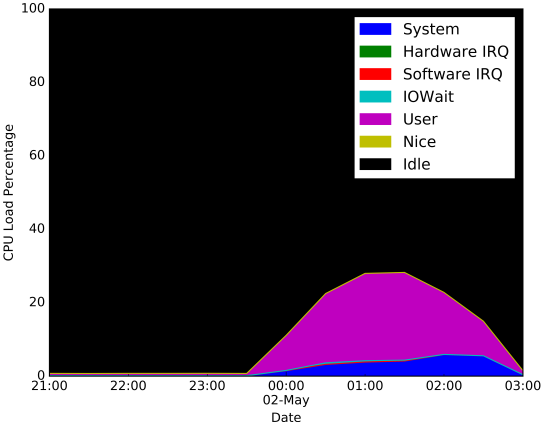— stats.gauges.mosquitto.bytes_sent — stats.gauges.mosquitto.bytes_recieved
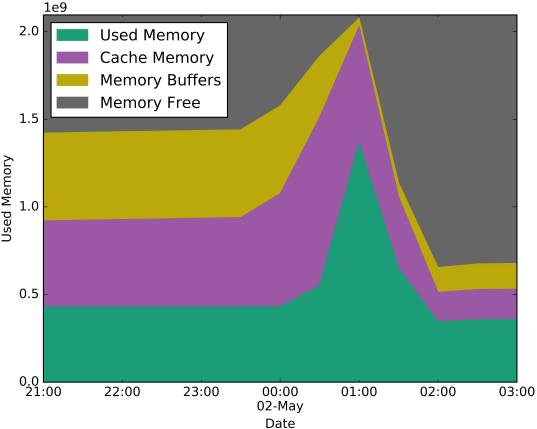
Manually Load Testing

CPU Usage:

Memory Usage:

Applications for Firehose

- 3rd Party CI Operators
- Desktop Notifications
- Inter Service communication

Where to get more information

MQTT:

- http://mqtt.org/
- http://docs.oasis-open.org/mqtt/mqtt/v3.1.1/os/mqtt-v3.1.1-os.html
- https://mosquitto.org/
- https://www.eclipse.org/paho/
- #mqtt on Freenode
- https://github.com/mtreinish/pymqttbench

Firehose:

- openstack-infra ML openstack-infra@lists.openstack.org
- #openstack-infra on Freenode
- http://docs.openstack.org/infra/system-config/firehose.html
- https://docs.openstack.org/infra/system-config/firehose_schema.html