Debugging DBus

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What is DBus?

- Simple Message Bus

- Divided into System/Session instances

- De facto IPC for services on Ubuntu

DBus Message

key	values	description
type	signal, method_call, method_return, error	How the message behaves
sender	Address in the form :0.1	Who the message originated from
interface	String in the reverse domain form (com.canonical.foo)	Chooses which interface the client is expecting to use *(next slide)*
member	string	Select which part of the interface to use
path	String in the form /foo/bar	Provides a way for services to provide multiple end points to clients
destination	Address *(typically unset for signals)*	Provides routing suggestions to the DBus daemon
payload	Serialized data	Let's talk about this in a slide or two

DBus Interfaces

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<node name="/org/freedesktop/Notifications">
  <interface name="org.freedesktop.Notifications">

    <method name="Notify">
      <arg type="s" name="app_name" direction="in" />
      <arg type="u" name="id" direction="in" />
      <arg type="s" name="icon" direction="in" />
      <arg type="s" name="summary" direction="in" />
      <arg type="s" name="body" direction="in" />
      <arg type="as" name="actions" direction="in" />
      <arg type="a{sv}" name="hints" direction="in" />
      <arg type="i" name="timeout" direction="in" />
      <arg type="u" name="return_id" direction="out" />
    </method>

    <method name="CloseNotification">
      <arg type="u" name="id" direction="in" />
    </method>
  </interface>
</node>
```

DBus Types For Payloads

Character	Type
y	8-bit unsigned integer
b	boolean
n	16-bit signed integer
q	16-bit unsigned integer
i	32-bit signed integer
u	32-bit unsigned integer
x	64-bit signed integer
t	64-bit unsigned integer
d	double-precision floating point
s	UTF8 string (no embedded null)
o	DBus object path
a	Array
v	Variant
h	Unix file descriptor
( )	Structure (i.e. a(ss), a(iisv), a(sa(ss)inqay)

DBus Introspection

```
$ gdbus call --session --dest
org.freedesktop.Notifications --object-
path /org/freedesktop/Notifications --method
org.freedesktop.DBus.Introspectable.Introspe
ct
```

('<!DOCTYPE node PUBLIC "-//freedesktop//DTD D-BUS Object Introspection
1.0//EN"\n"http://www.freedesktop.org/standards/dbus/1.0/introspect.dtd">\n<node>\n <interface
name="org.freedesktop.DBus.Introspectable">\n   <method name="Introspect">\n   <arg name="data" direction="out"
type="s"/>\n   </method>\n </interface>\n <interface name="org.freedesktop.DBus.Properties">\n   <method
name="Get">\n   <arg name="interface" direction="in" type="s"/>\n   <arg name="propname" direction="in"
type="s"/>\n   <arg name="value" direction="out" type="v"/>\n   </method>\n   <method name="Set">\n   <arg
name="interface" direction="in" type="s"/>\n   <arg name="propname" direction="in" type="s"/>\n   <arg
name="value" direction="in" type="v"/>\n   </method>\n   <method name="GetAll">\n   <arg name="interface"
direction="in" type="s"/>\n   <arg name="props" direction="out" type="a{sv}"/>\n   </method>\n </interface>\n
<interface name="org.freedesktop.Notifications">\n   <method name="GetServerInformation">\n   <arg
name="return_name" type="s" direction="out"/>\n   <arg name="return_vendor" type="s" direction="out"/>\n   <arg
name="return_version" type="s" direction="out"/>\n   <arg name="return_spec_version" type="s" direction="out"/>\n
</method>\n   <method name="GetCapabilities">\n   <arg name="return_caps" type="as" direction="out"/>\n
</method>\n   <method name="CloseNotification">\n   <arg name="id" type="u" direction="in"/>\n   </method>\n
<method name="Notify">\n   <arg name="app_name" type="s" direction="in"/>\n   <arg name="id" type="u"
direction="in"/>\n   <arg name="icon" type="s" direction="in"/>\n   <arg name="summary" type="s"
direction="in"/>\n   <arg name="body" type="s" direction="in"/>\n   <arg name="actions" type="as"
direction="in"/>\n   <arg name="hints" type="a{sv}" direction="in"/>\n   <arg name="timeout" type="i"
direction="in"/>\n   <arg name="return_id" type="u" direction="out"/>\n   </method>\n </interface>\n</node>\n',)
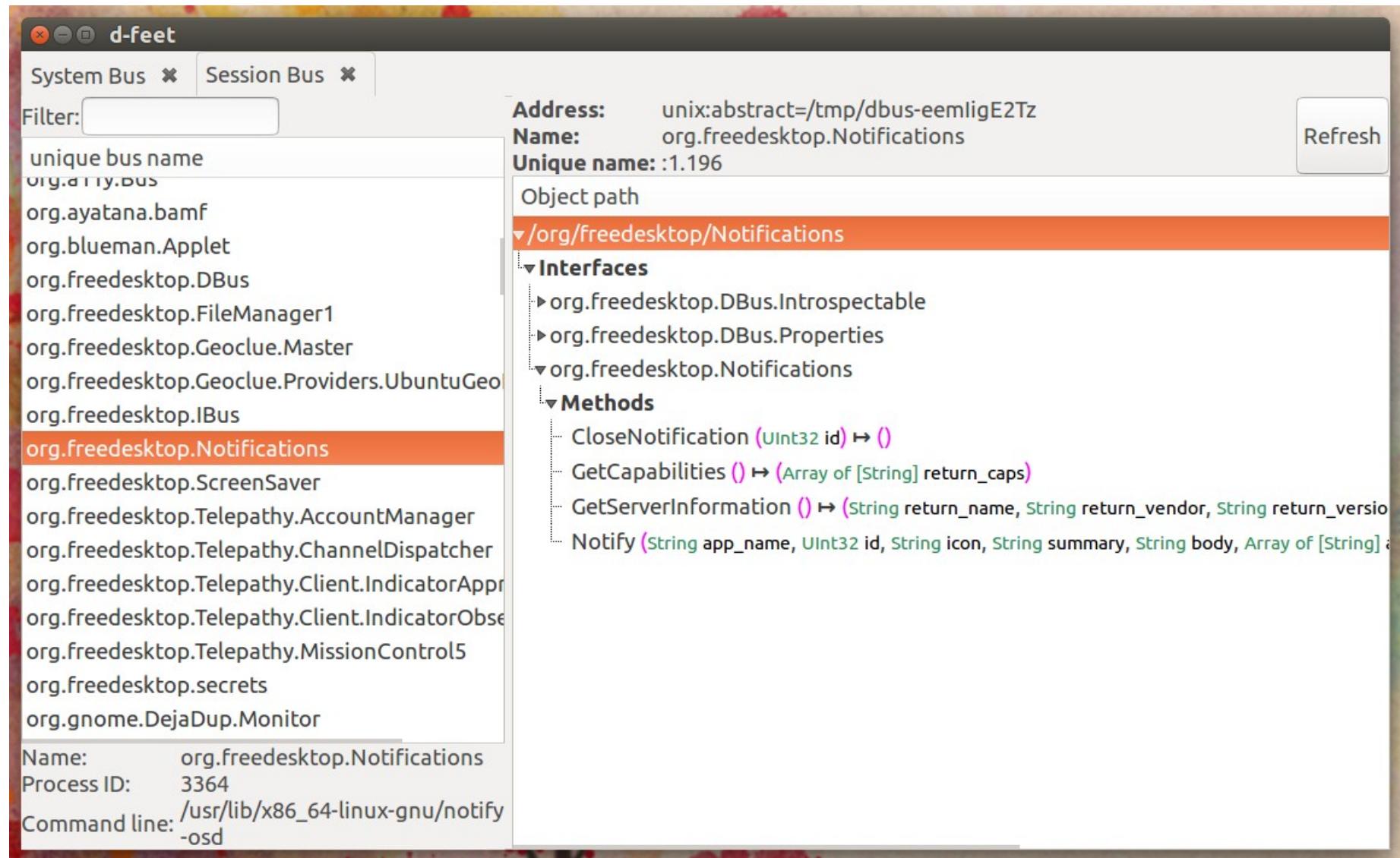
DBus Monitor

```
$ dbus-monitor interface=org.freedesktop.Notifications

method call sender=:1.156 -> dest=:1.59 serial=6 path=/org/freedesktop/Notifications;
interface=org.freedesktop.Notifications; member=GetServerInformation

method call sender=:1.156 -> dest=:1.59 serial=7 path=/org/freedesktop/Notifications;
interface=org.freedesktop.Notifications; member=Notify
    string "notify-send"
    uint32 0
    string ""
    string "example"
    string ""
    array [
    ]
    array [
        dict entry(
            string "urgency"
            variant             byte 1
        )
    ]
    int32 -1
```

Bustle

```
$ bustle-pcap test.bustle
Logging D-Bus traffic to 'test.bustle'...
Hit Control-C to stop logging.
$ bustle test.bustle
```
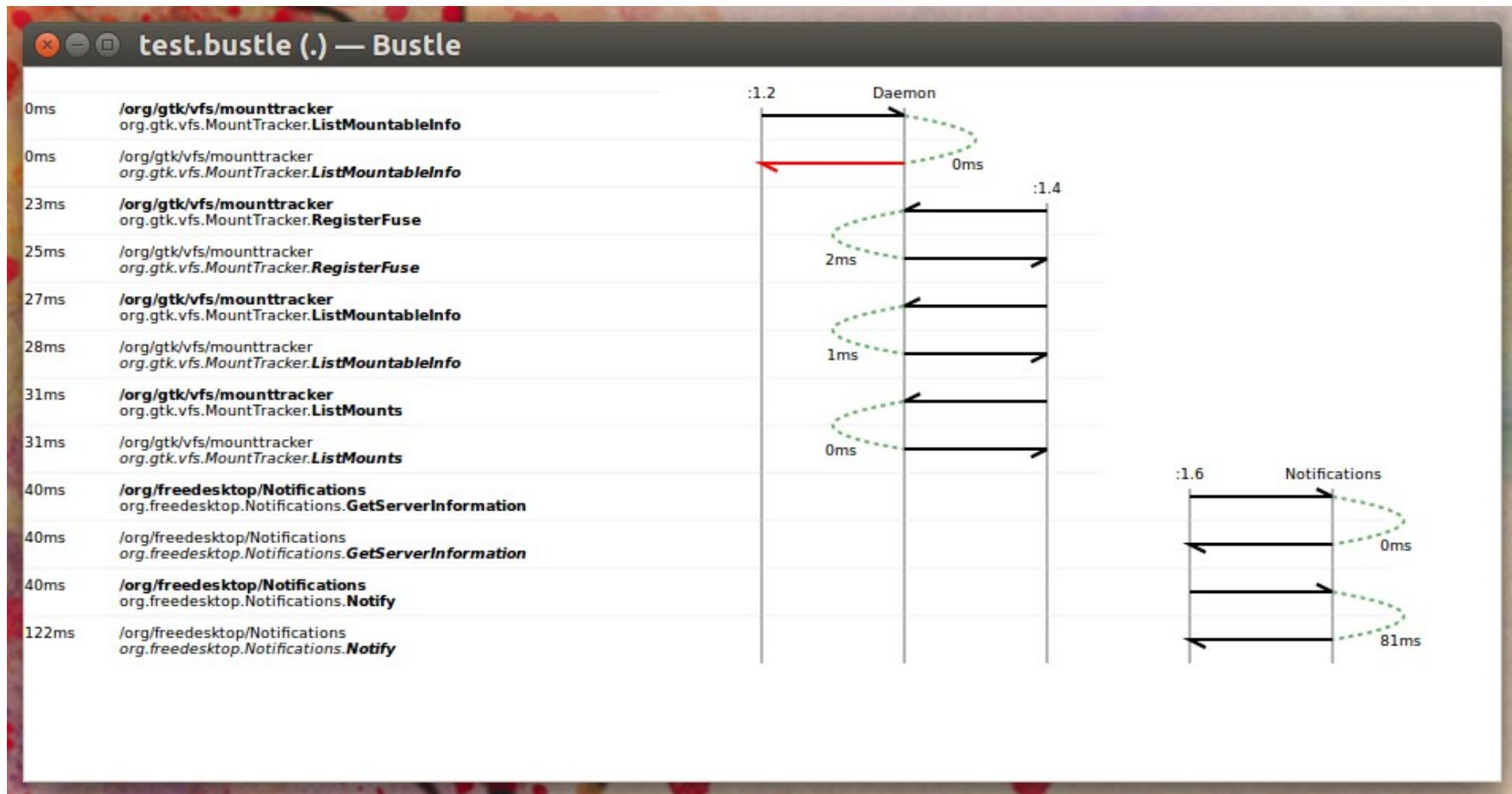
D-Feet (Introspection)

D-Feet (Method Call)