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Introduction to D-Bus

https://aleksander.es/data/GNOMEASIA2014-Examples/

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Introduction to D-Bus

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1) What is D-Bus?
2) Architecture
3) Use cases
4) GDBus
5) Example: service in C, with gdbus-codegen
6) Example: clients in Python and JavaScript
7) Other tools: d-feet, dbus-monitor, dbus-send

1. What is D-Bus?

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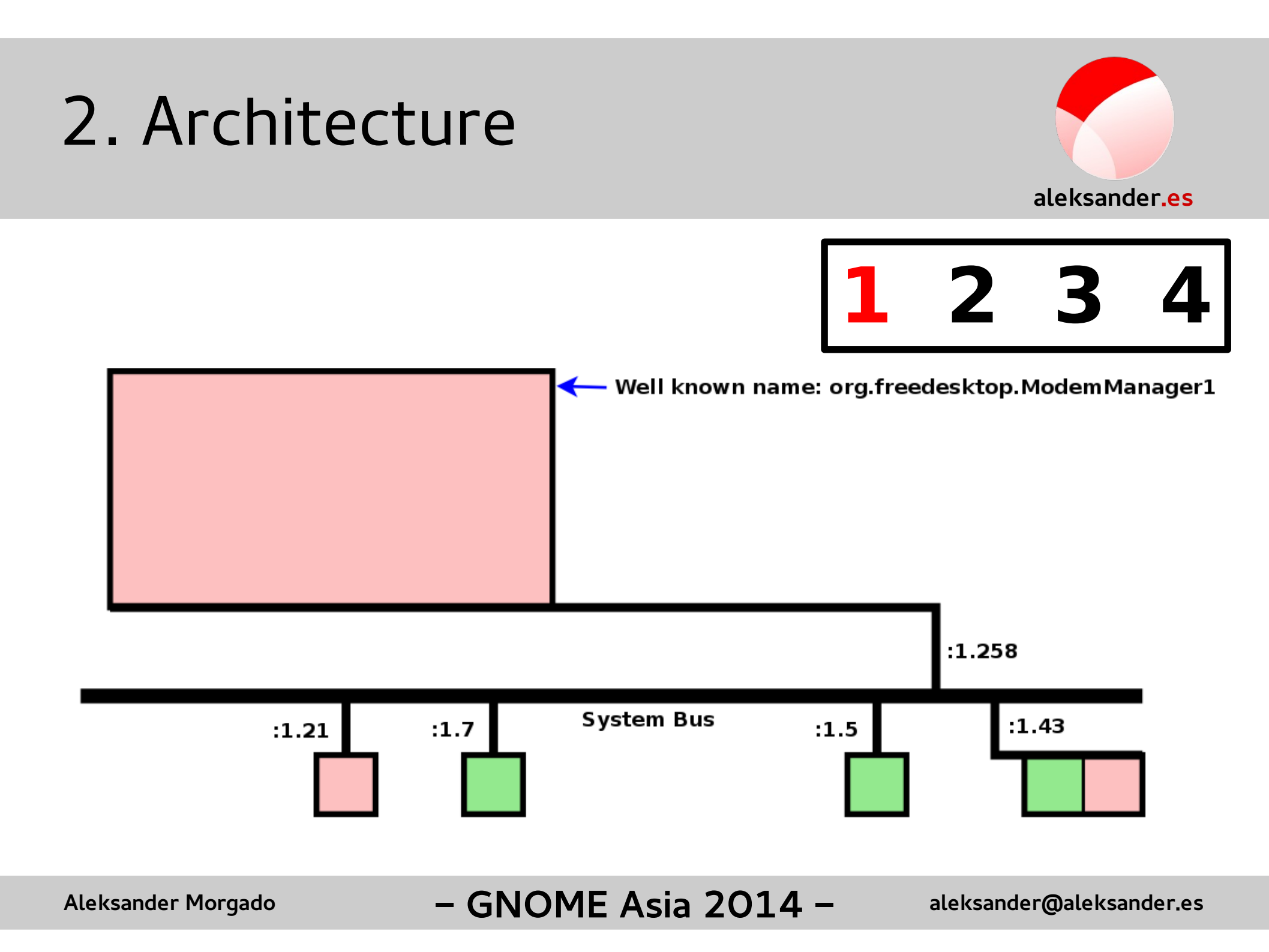
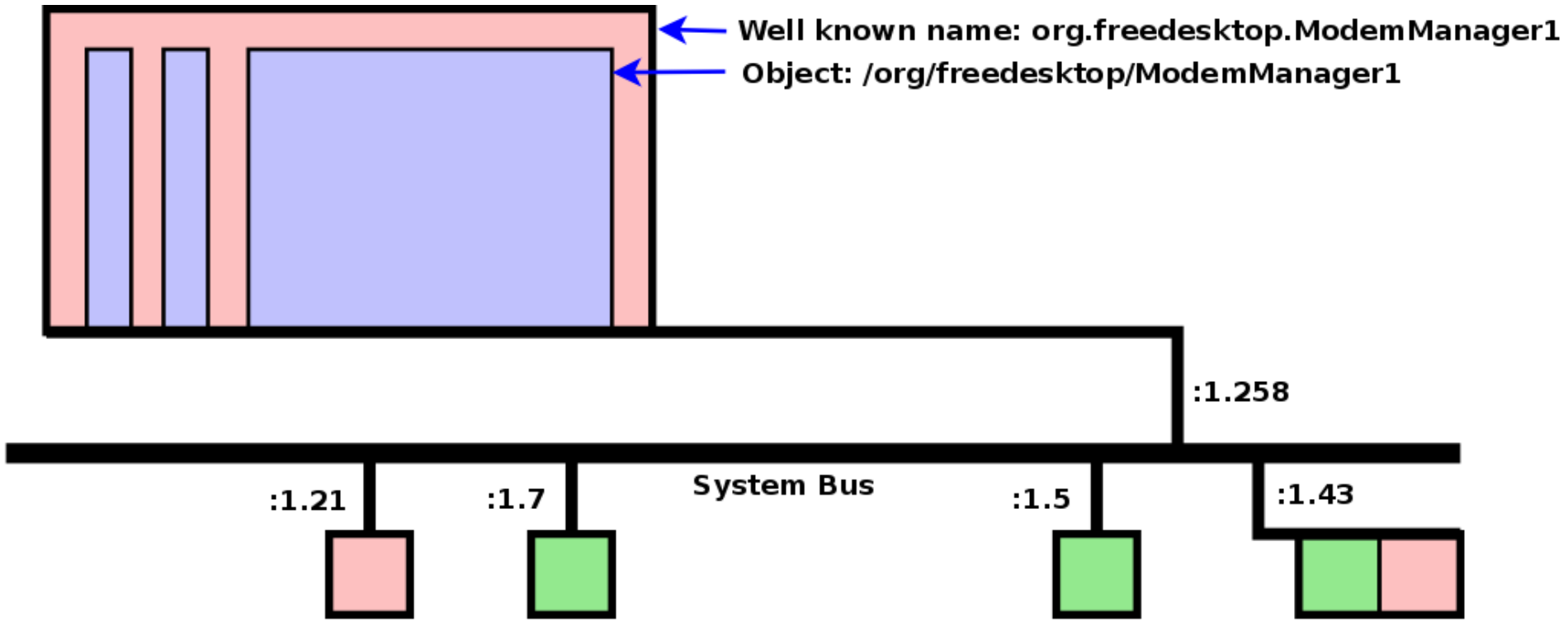
- High level IPC (inter process comm.)
  - Multicast & point-to-point
  - OS/architecture/language independent
  - System Bus & Session Bus
  - Linux kernel: kdbus!
- freedesktop.org
  - GNOME, KDE, xfce

2. Architecture



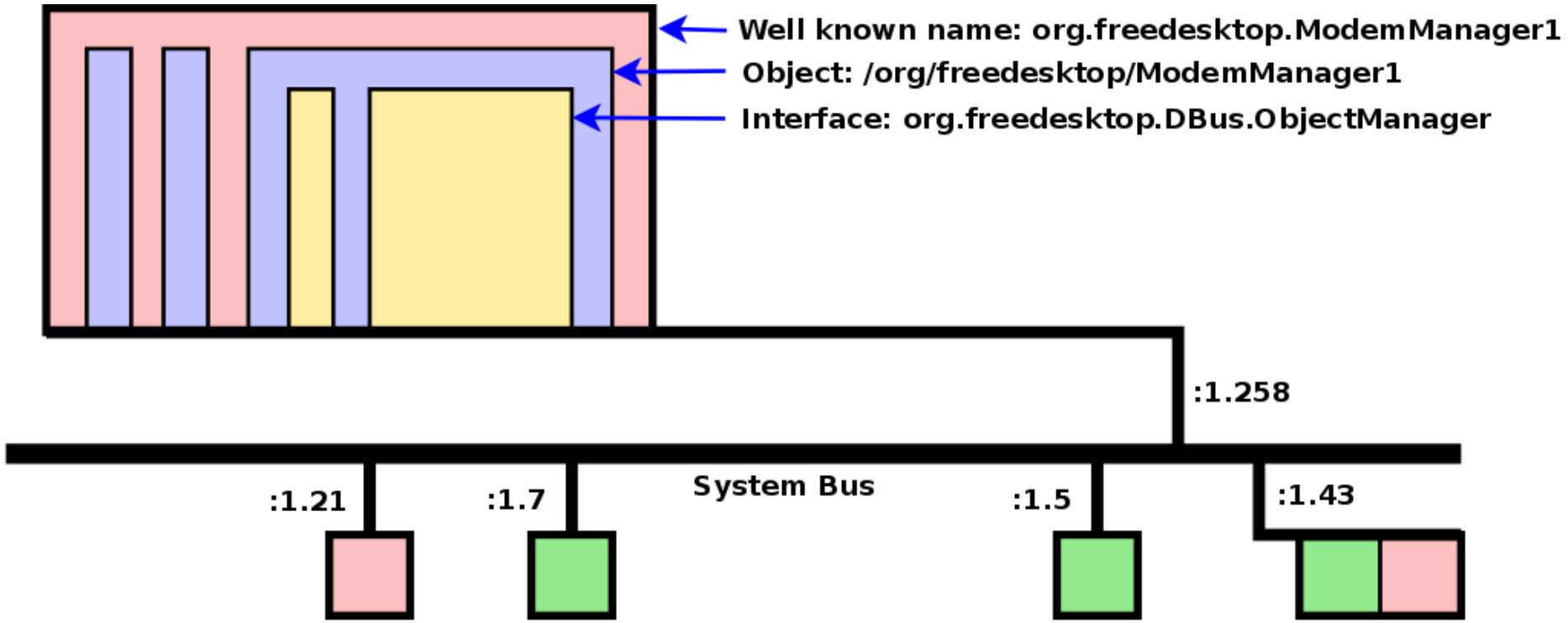
2. Architecture

1 2 3 4

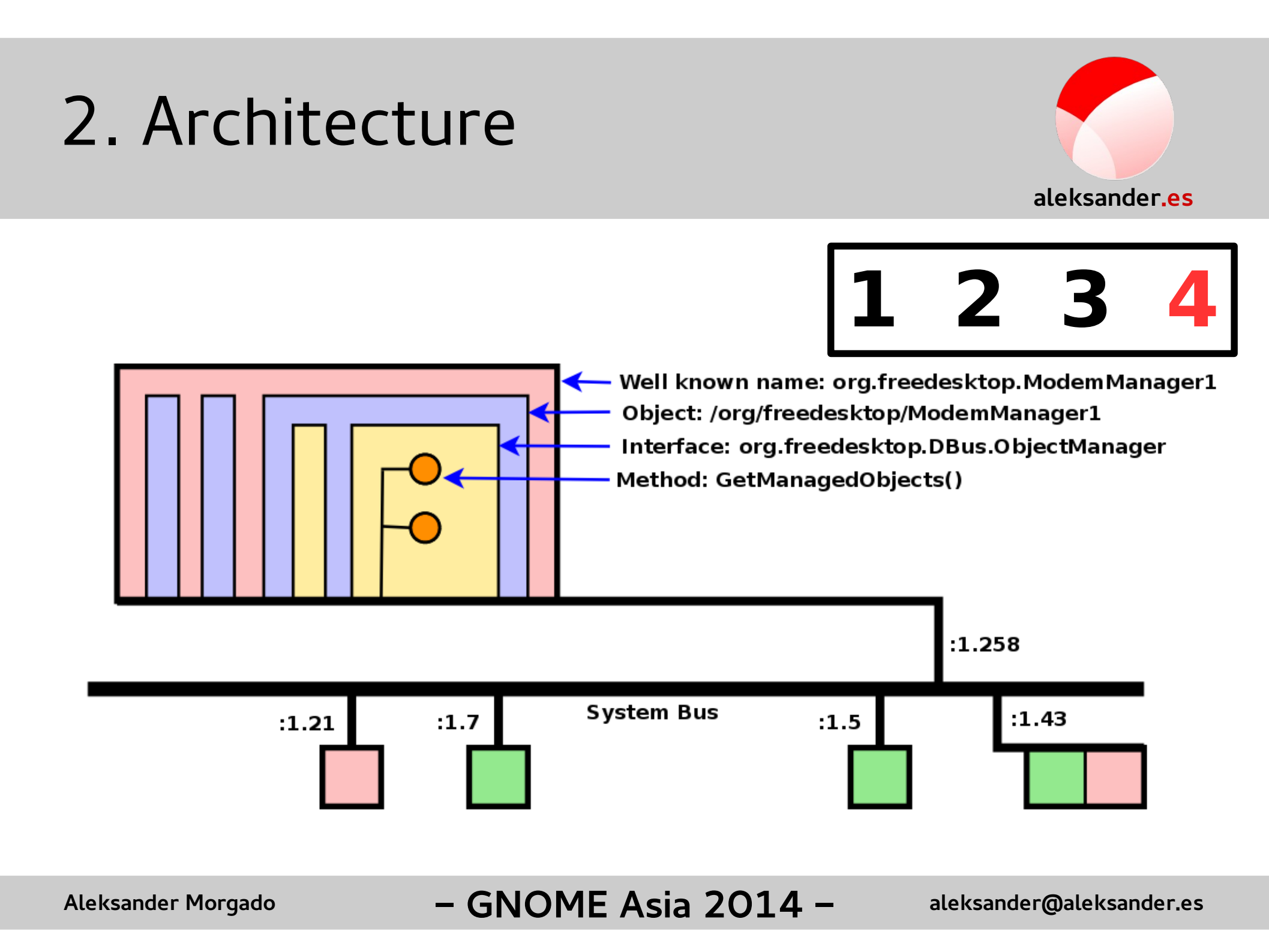


2. Architecture

1 2 3 4



2. Architecture



2. Architecture

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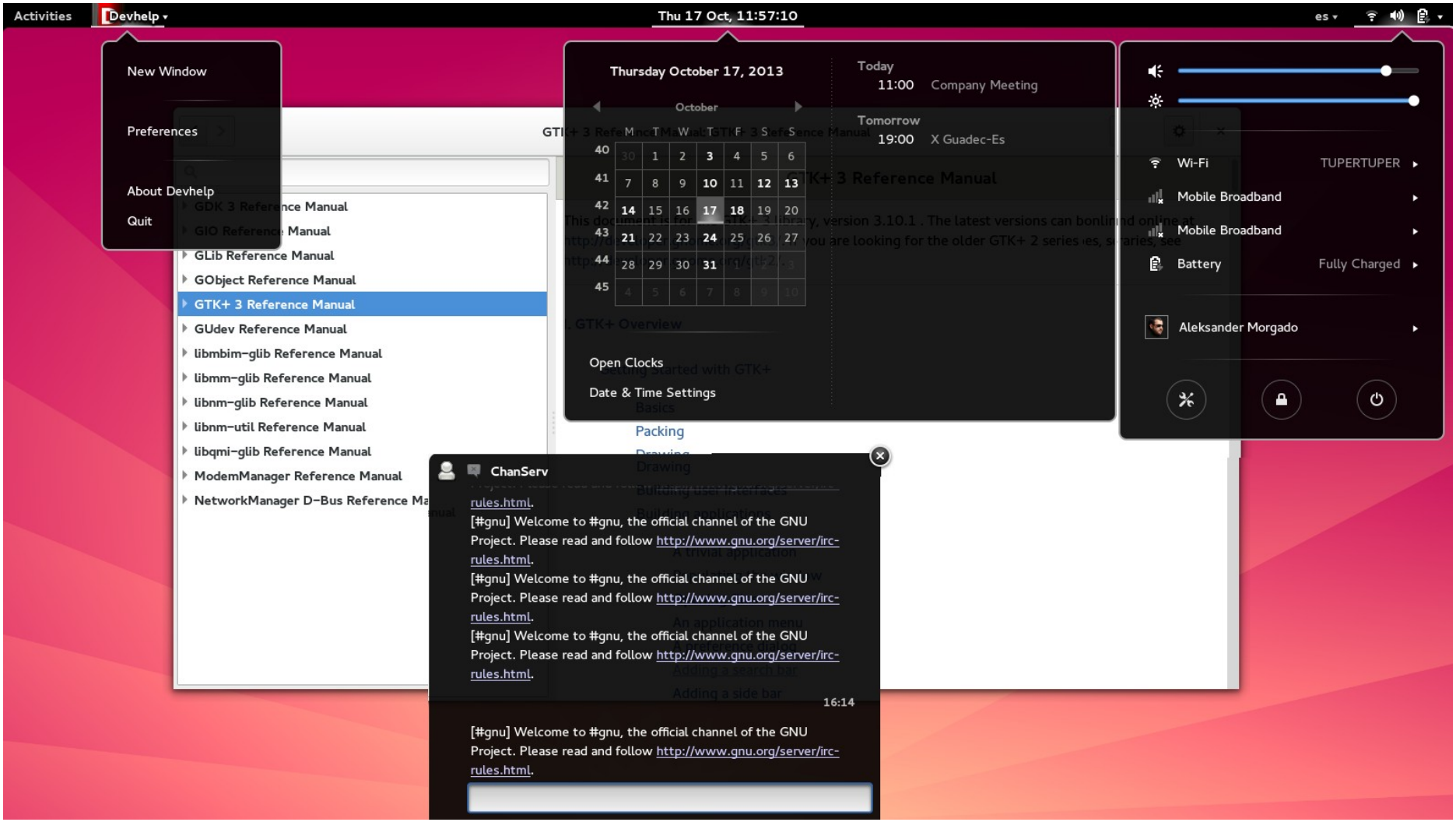
- Unique name
  - Servers: well-known name
    - Objects
      - Interfaces
        - Methods
        - Properties (R/W)
        - Signals

3. Use cases


Activities
Devhelp
Thu 17 Oct, 11:57:10
es
New Window
Preferences
About Devhelp
Quit
GDK 3 Reference Manual
GIO Reference Manual
GLib Reference Manual
GObject Reference Manual
GTK+ 3 Reference Manual
GUdev Reference Manual
libmbim-glib Reference Manual
libmm-glib Reference Manual
libnm-glib Reference Manual
libnm-util Reference Manual
libqmi-glib Reference Manual
ModemManager Reference Manual
NetworkManager D-Bus Reference Ma
Thursday October 17, 2013
October
Today
11:00 Company Meeting
Tomorrow
19:00 X Guadec-Es
Open Clocks
Date & Time Settings
Wi-Fi TUPERTUPER
Mobile Broadband
Mobile Broadband
Battery Fully Charged
Aleksander Morgado
ChanServ
[#gnu] Welcome to #gnu, the official channel of the GNU Project. Please read and follow http://www.gnu.org/server/irc-rules.html.
16:14

4. GDBus

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- Available since Glib/GIO 2.30
  - Replaces dbus-glib
- GObject Introspection --> JS, Python...
- GVariant
- Native support for:
  - org.freedesktop.Dbus.Properties
  - org.freedesktop.Dbus.ObjectManager
- gdbus-codegen

5. Examples: Service

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```
<?xml version="1.0" encoding="UTF-8" ?>
<node name="/" xmlns:doc="http://www.freedesktop.org/dbus/1.0/doc.dtd">
  <interface name="es.aleksander.Alarm">
    <method name="Configure">
      <arg name="seconds" type="u" direction="in"  />
    </method>
    <property name="Activated" type="b" access="read" />
    <signal name="Beeeeeeeeep" />
  </interface>
</node>
```

5. Examples: gdbus-codegen

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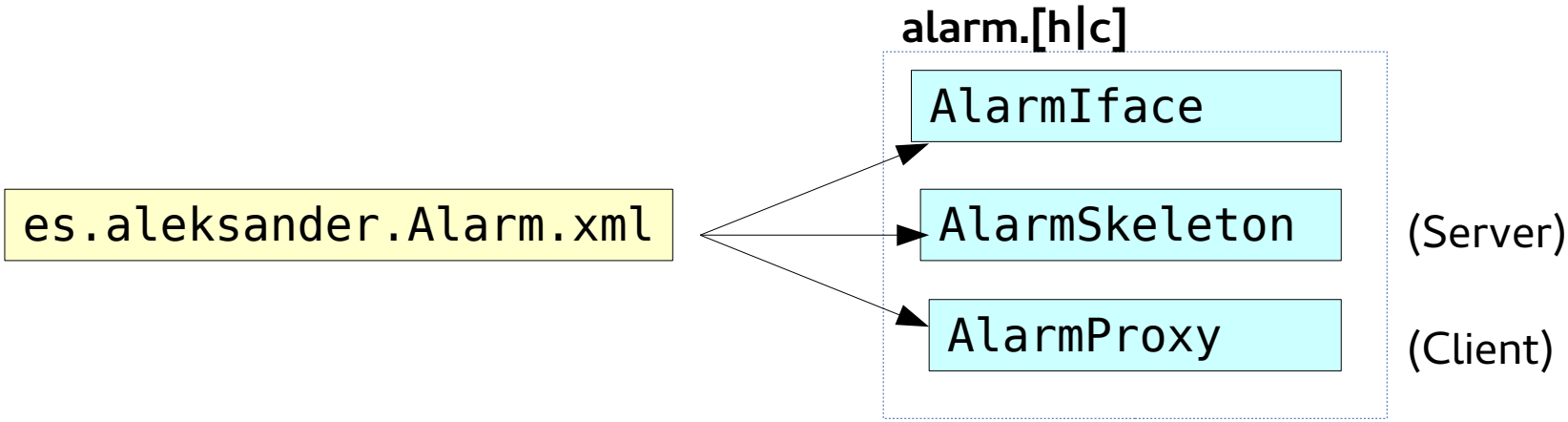
```
$ gdbus-codegen \
    --interface-prefix es.aleksander \
    --generate-c-code alarm \
    es.aleksander.Alarm.xml
```



5. Examples: Service in C

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```
void main (void)
{
  GMainLoop *loop;

  loop = g_main_loop_new (NULL, FALSE);
  g_bus_own_name (G_BUS_TYPE_SESSION,
                  "es.aleksander.Alarm",
                  G_BUS_NAME_OWNER_FLAGS_NONE,
                  NULL,
                  on_name_acquired,
                  NULL,
                  NULL,
                  NULL);
  g_main_loop_run (loop);
}
```

1 2 3 4

5. Examples: Service in C

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```
static void
on_name_acquired (GDBusConnection *connection,
                  const gchar *name,
                  gpointer user_data)
{
  Alarm *skeleton;

  skeleton = alarm_skeleton_new ();
  g_signal_connect (skeleton,
                    "handle-configure",
                    G_CALLBACK (on_handle_configure),
                    NULL);

  g_dbus_interface_skeleton_export (G_DBUS_INTERFACE_SKELETON (skeleton),
                                    connection,
                                    "/es/aleksander/Alarm",
                                    NULL);
}
```

1 2 3 4

5. Examples: Service in C

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```
static gboolean
on_handle_configure (Alarm *skeleton,
                     GDBusMethodInvocation *invocation,
                     guint seconds,
                     gpointer user_data)
{
  if (alarm_get_activated (skeleton)) {
    g_dbus_method_invocation_return_error_literal (
      invocation, G_IO_ERROR, G_IO_ERROR_EXISTS, "Exists");
    return;
  }

  alarm_set_activated (skeleton, TRUE);
  g_timeout_add_seconds (seconds, emit_alarm_cb, skeleton);
  alarm_complete_configure (skeleton, invocation);
}
```

1 2 3 4

5. Examples: Service in C

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```
static gboolean
emit_alarm_cb (gpointer skeleton)
{
  alarm_emit_beeeeeeeeeep (ALARM (skeleton));
  alarm_set_activated (ALARM (skeleton), FALSE);
  return FALSE;
}
```

1 2 3 4

6. Examples: Client in JS

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1

```
const InterfaceAlarm = <interface name="es.aleksander.Alarm">
    <signal name="Beeeeeeeeep" />
</interface>;
const ProxyAlarm = Gio.DBusProxy.makeProxyWrapper(InterfaceAlarm);

let proxy = new ProxyAlarm(Gio.DBus.session,
                           'es.aleksander.Alarm',
                           '/es/aleksander/Alarm');
proxy.connectSignal('Beeeeeeeeep',
    Lang.bind(this, function(proxy, sender_name) {
        print('\n\nBEEEEEEEEEEEEEEEEEEEP!\n\n')
    }));

Mainloop.run();
```

6. Examples: Client in Python

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1

```
connection = Gio.bus_get_sync(Gio.BusType.SESSION, None)
proxy = Gio.DBusProxy.new_sync(connection,
                               Gio.DBusProxyFlags.NONE,
                               None,
                               "es.aleksander.Alarm",
                               "/es/aleksander/Alarm",
                               "es.aleksander.Alarm",
                               None)
try:
    proxy.call_sync("Configure",
                    GLib.Variant("(u)", (10,)),
                    Gio.DBusCallFlags.NONE,
                    -1,
                    None)
except Exception as e:
    sys.stderr.write("Error: %s\n" % str(e))
```

7. Tools: dbus-send

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```
$ dbus-send \
    --session \
    --print-reply \
    --dest=es.aleksander.Alarm \
    /es/aleksander/Alarm \
    es.aleksander.Alarm.Configure \
    uint32:10
```

7. Tools: dbus-monitor

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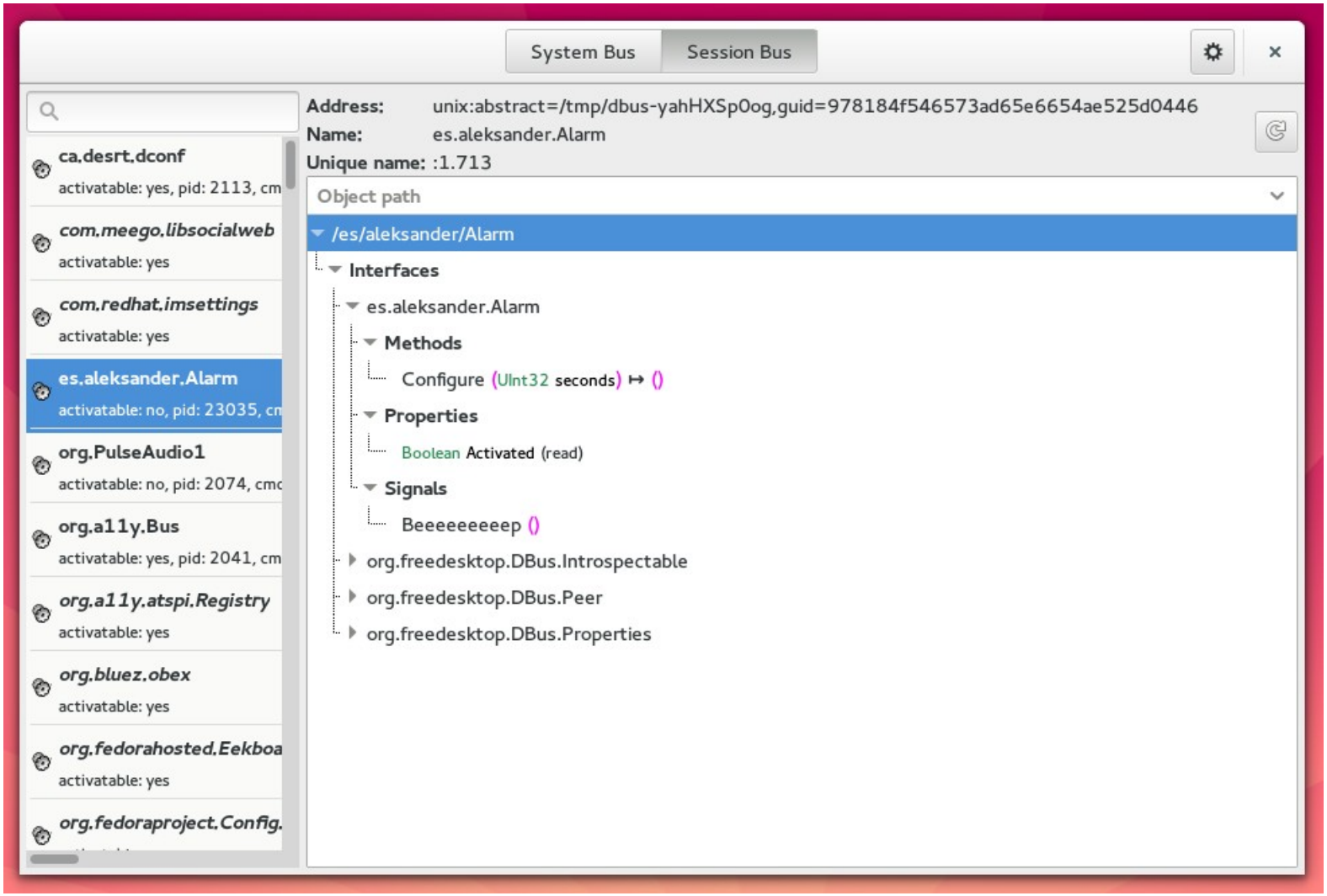
- Monitors all messages going through the bus
  - `dbus-monitor --session`
  - `dbus-monitor --system`

7. Tools: d-feet



Thanks!

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