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## HVAC DEMO

This document describes the purpose, setup, and launch of the HVAC demo that is the first milestone of the RVI project.

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## BACKGROUND

The remote HVAC control demo is a part of the Automotive Grade Linux project where the Tizen IVI climate control (HVAC) screen can be remotely controlled from a mobile device. Updates made to the IVI HVAC screen are sent in real time to the mobile device, and vice versa.

An initial release of the remote HVAC demo was done using the MQTT protocol (See <http://mqtt.org>). The first milestone of the RVI project will migrate the HVAC demo to the RVI technology.

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## READER ASSUMPTIONS

The reader is assumed to be able to:

1. Have a basic understanding of Linux directory structures.
2. Start and stop programs on the RVI-hosting system

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## PREREQUISITES

1. Erlang runtime R16B01 or later has to be installed on the hosting system.
2. The `setup_rvi_node.sh` tool is available to build a release.
3. The `rvi_node.sh` tool is available to execute a release.
4. `hvac_demo/` is available with its demo code and configuration files.

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## DEMO COMPONENTS

The demo is broken into three components that connect to two RVI nodes. All components can be run on a single system.

Please see schematics below for an overview:

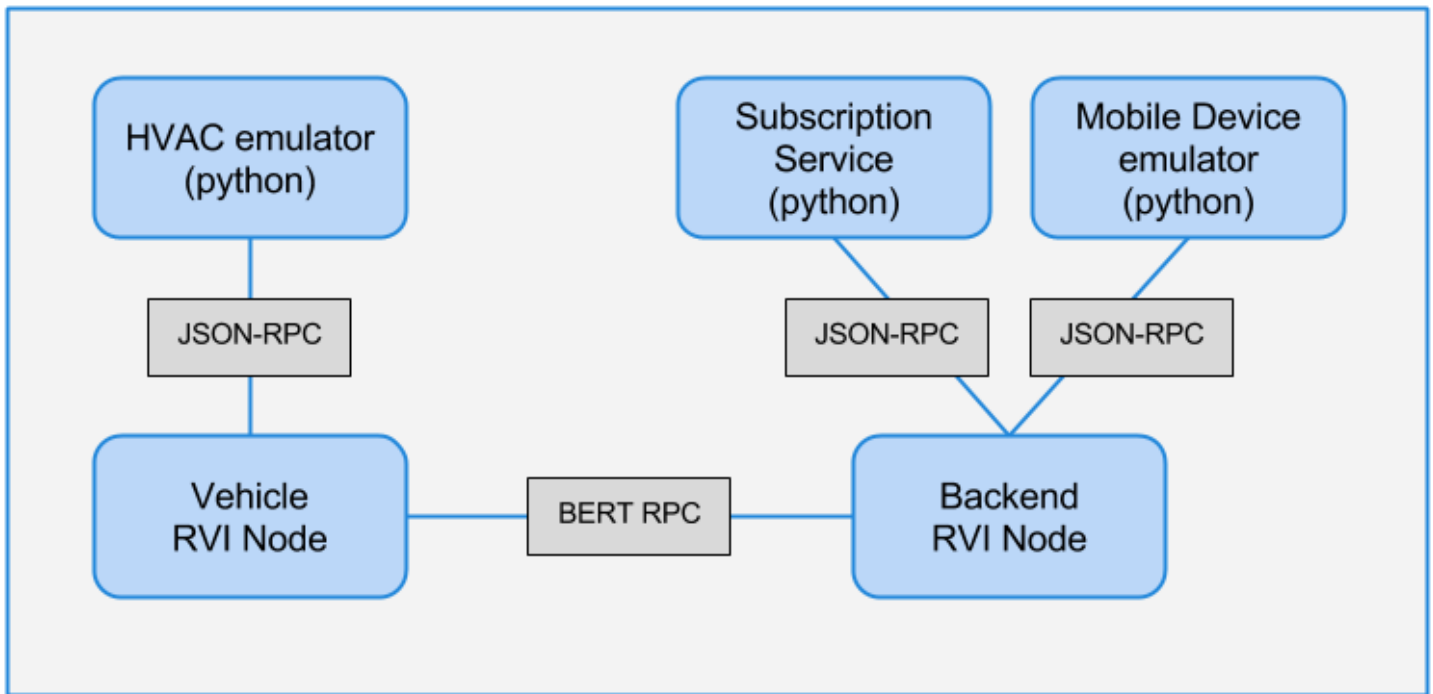


Figure 1. Demo schematics

## SUBSCRIPTION SERVICE

This directory contains a simple subscription service (`subscription_service.py`) replacing the MQTT broker. The subscription service lets the vehicle and mobile devices setup subscriptions so that they receive notifications when the HVAC values for a specific VIN (Vehicle Identification Number) have been updated. The service is, in effect, a standard publish/subscribe setup.

## HVAC EMULATOR

In order to test the RVI milestone 1 and the subscription service without having to bring up a complete Tizen IVI and mobile device environment, a simple emulator for these two components have been provided in `hvac_emulator.py` and `mobile_emulator.py`

The HVAC emulator simulates the HVAC application running on a head unit in a vehicle. It uses a VIN number, a part of the service prefix of the vehicle RVI node, as a unique identifier and subscribes to HVAC updates, such as fan speed, originating from the mobile device emulator.

The HVAC emulator can also have new HVAC values entered on the command line and send them to any connected mobile device emulators.

All subscriptions and updates are bounced off the subscription service connected to the backend RVI node.

## MOBILE DEVICE EMULATOR

The mobile device emulator connects to the backend server and registers itself as a service where a phone number, provided as a command line argument, is a part of the service name. The mobile controls a specific VIN, also provided as a command line argument.

Just like the HVAC emulator, the all subscriptions and updates are bounced of the subscription service.

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## DEMO SETUP

Two RVI nodes, both hosted by a single machine, will be involved in the test:

The backend RVI node will host the subscription service (`subscription_service.py`) and the mobile emulator (`mobile_emulator.py`).

The vehicle RVI node will host the HVAC emulator (`hvac_emulator.py`).

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## COMPILE THE RVI SYSTEM

See `../BUILD.md` for details.

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## CREATE THE VEHICLE DEVELOPMENT RELEASE

See `../CONFIGURE.md` for details on the configuration process.

From the `rvi` root directory, setup the vehicle node:

```
./setup_rvi_node.sh vehicle hvac_demo/vehicle.config
```

The new developer release will be created in a subdirectory named `vehicle`

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## CREATE THE BACKEND DEVELOPMENT RELEASE

In a similar manner, setup the backend node:

```
./setup_rvi_node.sh backend hvac_demo/backend.config
```

The release will be created in a subdirectory named `backend`

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## LAUNCH THE VEHICLE RVI NODE

In its own window, launch the vehicle RVI node that will serve the HVAC emulator.

```
./rvi_node.sh -n vehicle
```

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The VIN number that will be used by the mobile device are the digits at the end of the "Node Service Prefix" printed out at the end of the launch process.

By default, the `hvac_demo/vehicle.config` file has its `node_service_prefix` entry set to `jlrc.com/vin/1234/`, yielding a VIN of "1234".

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## DEMO LAUNCH

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### LAUNCH THE BACKEND RVI NODE

In its own window, launch the backend rvi node that the subscription service and mobile device emulator will connect to.

```
./rvi_node.sh -n backend
```

Make a note of the Service Edge URL address printed out by the logging service.

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### LAUNCH THE SUBSCRIPTION SERVICE

In its own window, launch the subscription service and specify the URL of the backend RVI node's Service Edge:

```
cd hvac_demo
./subscription_service.py http://127.0.0.1:8801
```

Modify the `http://127.0.0.1:8801` to match the URL reported by the backend RVI node.

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### LAUNCH THE HVAC EMULATOR

In its own window, launch the HVAC emulator and have it connect to the vehicle RVI node.

```
cd hvac_demo
./hvac_emulator.py http://127.0.0.1:8811
```

Modify the `http://127.0.0.1:8811` to match the Service Edge URL reported by the vehicle RVI node.

At startup the HVAC emulator will report the VIN number that it is associated with. (Default 1234)

The HVAC emulator accepts `[key] [value]` input lines that are distributed to all mobile devices controlling the VIN of the vehicle RVI node.

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### LAUNCH THE MOBILE DEVICE EMULATOR

In its own window, launch the mobile device emulator and have it connect to the backend RVI node.

```
cd hvac_demo
./mobile_emulator.py http://127.0.0.1:8801 +1941231234 1234
```

Modify the `http://127.0.0.1:8801` to match the Service Edge URL reported by the backend RVI node.

The phone number (+19491231234) is arbitrary, but has to be unique across all running mobile device emulators.

The VIN number (1234) is the VIN number reported by the HVAC emulator at startup.

The mobile device emulator accepts [key] [value] input lines that are distributed to the vehicle with the matching VIN.

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## DEMO EXECUTION

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### SEND VALUES FROM MOBILE TO HVAC EMULATOR

Any [key] [value] entered in the mobile device emulator will be sent up to the subscription service and forwarded to the HVAC emulator.

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### SEND VALUES FROM HVAC TO MOBILE EMULATOR

Any [key] [value] entered in the HVAC emulator will be sent up to the subscription service and forwarded to the mobile emulator.

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## EXIT PROGRAMS

Terminate the mobile device emulator by entering "q" followed by enter.

Terminate the HVAC emulator by entering "q" followed by enter.

Terminate the subscription service by pressing Ctrl-c.

Terminate the vehicle RVI node by pressing Ctrl-c Ctrl-c.

Terminate the backend RVI node by pressing Ctrl-c Ctrl-c.