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Analog & Digital Communication Lab

Project Demo

1. Node Red Code:

The following code is exported directly from NodeRed in json file format:

```json
[
    {
        "id": "9379173093fa6ab5",
        "type": "tab",
        "label": "Db to UbiDots",
        "disabled": false,
        "info": "This flow fetches air quality data from OpenAQ servers.",
        "env": []
    },
    {
        "id": "d494401dbd059004",
        "type": "tab",
        "label": "Fetching AQ Data",
        "disabled": false,
        "info": "",
        "env": []
    },
    {
        "id": "503668422e078d86",
        "type": "tab",
        "label": "Preprocessing",
        "disabled": false,
        "info": "",
        "env": []
    },
    {
        "id": "cc2e19e57c2f8442",
        "type": "tab",
        "label": "Dashboard",
        "disabled": false,
        "info": "",
        "env": []
    },
    {
        "id": "f098b23791c03952",
        "type": "ui_tab",
        "name": "Real Time Air Quality Monitoring",
        "icon": "dashboard",
        "disabled": false,
        "hidden": false
    },
```

```json
{
    "id": "c24e4cd2c2a701e4",
    "type": "ui_base",
    "theme": {
        "name": "theme-dark",
        "lightTheme": {
            "default": "#0094CE",
            "baseColor": "#0094CE",
            "baseFont": "-apple-system,BlinkMacSystemFont,Segoe
UI,Roboto,Oxygen-Sans,Ubuntu,Cantarell,Helvetica Neue,sans-serif",
            "edited": true,
            "reset": false
        },
        "darkTheme": {
            "default": "#097479",
            "baseColor": "#097479",
            "baseFont": "Copperplate,Copperplate Gothic Light,fantasy",
            "edited": true,
            "reset": false
        },
        "customTheme": {
            "name": "Untitled Theme 1",
            "default": "#4B7930",
            "baseColor": "#4B7930",
            "baseFont": "-apple-system,BlinkMacSystemFont,Segoe
UI,Roboto,Oxygen-Sans,Ubuntu,Cantarell,Helvetica Neue,sans-serif"
        },
        "themeState": {
            "base-color": {
                "default": "#097479",
                "value": "#097479",
                "edited": false
            },
            "page-titlebar-backgroundColor": {
                "value": "#097479",
                "edited": false
            },
            "page-backgroundColor": {
                "value": "#111111",
                "edited": false
            },
            "page-sidebar-backgroundColor": {
                "value": "#333333",
                "edited": false
            },
            "group-textColor": {
                "value": "#0eb8c0",
                "edited": false
```

```
        },
        "group-borderColor": {
            "value": "#555555",
            "edited": false
        },
        "group-backgroundColor": {
            "value": "#333333",
            "edited": false
        },
        "widget-textColor": {
            "value": "#eeeeee",
            "edited": false
        },
        "widget-backgroundColor": {
            "value": "#097479",
            "edited": false
        },
        "widget-borderColor": {
            "value": "#333333",
            "edited": false
        },
        "base-font": {
            "value": "Copperplate,Copperplate Gothic Light,fantasy"
        }
    },
    "angularTheme": {
        "primary": "indigo",
        "accents": "blue",
        "warn": "red",
        "background": "grey",
        "palette": "light"
    }
},
"site": {
    "name": "Node-RED Dashboard",
    "hideToolbar": "false",
    "allowSwipe": "false",
    "lockMenu": "false",
    "allowTempTheme": "true",
    "dateFormat": "DD/MM/YYYY",
    "sizes": {
        "sx": 48,
        "sy": 48,
        "gx": 6,
        "gy": 6,
        "cx": 6,
        "cy": 6,
        "px": 0,
```

```
                "py": 0
            }
        }
    },
    {
        "id": "3875479a2e2fbaeb",
        "type": "ui_group",
        "name": "Filter",
        "tab": "f098b23791c03952",
        "order": 1,
        "disp": true,
        "width": "6",
        "collapse": false,
        "className": ""
    },
    {
        "id": "2998ee281704e555",
        "type": "ui_group",
        "name": "Chart",
        "tab": "f098b23791c03952",
        "order": 2,
        "disp": true,
        "width": "6",
        "collapse": false,
        "className": ""
    },
    {
        "id": "99e9f651b03faa0b",
        "type": "remote-config",
        "name": "Node-RED UI",
        "host": "localhost",
        "protocol": "http",
        "port": "1880",
        "baseurl": "/ui",
        "instancehash":
"mw3uo19sw3qap1gw12q20r14zti7okuztn9kvfejdknn6f8j7cvpp1psxtfhcood",
        "server": "nodered02.remote-red.com",
        "region": "de"
    },
    {
        "id": "9725200e93b8226b",
        "type": "inject",
        "z": "9379173093fa6ab5",
        "name": "",
        "props": [
            {
                "p": "payload"
            },
```

```json
            {
                "p": "topic",
                "vt": "str"
            }
        ],
        "repeat": "",
        "crontab": "",
        "once": false,
        "onceDelay": 0.1,
        "topic": "",
        "payload": "",
        "payloadType": "date",
        "x": 320,
        "y": 700,
        "wires": [
            [
                "20752ae6a7164eb6",
                "cb7725859198b11a",
                "2f8f61d7ef13895c",
                "cf73f37f45f86c05"
            ]
        ]
    },
    {
        "id": "20752ae6a7164eb6",
        "type": "openaq-cities",
        "z": "9379173093fa6ab5",
        "aqconfig": "",
        "orderby_country": true,
        "sort_country": "asc",
        "orderby_city": true,
        "sort_city": "asc",
        "country": "PK",
        "limit": 100,
        "page": 1,
        "name": "",
        "x": 600,
        "y": 310,
        "wires": [
            [
                "b9072514dc058a1d",
                "14641970c1bb8ad1",
                "62a182a8057cd856",
                "08f2994772e893ea"
            ]
        ]
    },
    {
```

```
        "id": "cb7725859198b11a",
        "type": "openaq-countries",
        "z": "9379173093fa6ab5",
        "aqconfig": "",
        "orderby_country": true,
        "sort_country": "asc",
        "orderby_count": true,
        "sort_count": "asc",
        "orderby_locations": true,
        "sort_locations": "asc",
        "limit": 100,
        "page": 1,
        "name": "",
        "x": 580,
        "y": 640,
        "wires": [
            [
                "8b290f37536e190a"
            ]
        ]
    },
    {
        "id": "2f8f61d7ef13895c",
        "type": "openaq-latest",
        "z": "9379173093fa6ab5",
        "aqconfig": "",
        "location": "",
        "city": "Karachi",
        "country": "PK",
        "latitude": "",
        "longitude": "",
        "radius": 2500,
        "orderby_location": true,
        "sort_location": "asc",
        "orderby_city": false,
        "sort_city": null,
        "orderby_country": false,
        "sort_country": null,
        "orderby_distance": false,
        "sort_distance": null,
        "parameter": "",
        "hasGeo": false,
        "limit": 100,
        "page": 1,
        "name": "",
        "x": 570,
        "y": 770,
        "wires": [
```

```
            [
                "4b8d438f2b310bad",
                "5390071579d41003",
                "978e4a6414519c76"
            ]
        ]
    },
    {
        "id": "7f35a7e83e2a4423",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "payload",
        "targetType": "msg",
        "statusVal": "",
        "statusType": "auto",
        "x": 1020,
        "y": 480,
        "wires": []
    },
    {
        "id": "2fd39e061c513e06",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1020,
        "y": 640,
        "wires": []
    },
    {
        "id": "cf73f37f45f86c05",
        "type": "openaq-parameters",
        "z": "9379173093fa6ab5",
        "aqconfig": "",
        "orderby_name": true,
        "sort_name": "asc",
        "orderby_preferredUnit": true,
```

```
    "sort_preferredUnit": "asc",
    "orderby_id": true,
    "sort_id": "asc",
    "limit": 100,
    "page": 1,
    "name": "",
    "x": 590,
    "y": 960,
    "wires": [
        [
            "712a7a71a62967c7",
            "6d17fa6e5ad940e1",
            "29fdc6c636e4e1ac",
            "b285c5029fd00444"
        ]
    ]
},
{
    "id": "bccb5da31125297a",
    "type": "debug",
    "z": "9379173093fa6ab5",
    "name": "",
    "active": false,
    "tosidebar": true,
    "console": false,
    "tostatus": false,
    "complete": "payload",
    "targetType": "msg",
    "statusVal": "",
    "statusType": "auto",
    "x": 1320,
    "y": 1230,
    "wires": []
},
{
    "id": "6d17fa6e5ad940e1",
    "type": "debug",
    "z": "9379173093fa6ab5",
    "name": "",
    "active": false,
    "tosidebar": true,
    "console": false,
    "tostatus": false,
    "complete": "false",
    "statusVal": "",
    "statusType": "auto",
    "x": 810,
    "y": 880,
```

```
        "wires": []
    },
    {
        "id": "b9072514dc058a1d",
        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "Cities List",
        "func": "let cities = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n   \n   cities.push(obj.city)
\n});\nreturn {payload: cities};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 790,
        "y": 440,
        "wires": [
            [
                "7f35a7e83e2a4423",
                "a2e53461c2916d34"
            ]
        ]
    },
    {
        "id": "712a7a71a62967c7",
        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "AQ Component Names List",
        "func": "let names = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n   \n   names.push(obj.name)
\n});\nreturn {payload: names};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 850,
        "y": 1140,
        "wires": [
            [
                "bccb5da31125297a",
                "58ae06fc6a2145f4"
            ]
        ]
    },
    {
        "id": "b285c5029fd00444",
```

```
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "Units List",
      "func": "let units = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n   \n   units.push(obj.preferredU
nit) \n});\nreturn {payload: units};",
      "outputs": 1,
      "noerr": 0,
      "initialize": "",
      "finalize": "",
      "libs": [],
      "x": 790,
      "y": 940,
      "wires": [
          [
              "c23704aa878db80c",
              "d45bbbad048abfef"
          ]
      ]
  },
  {
      "id": "8b290f37536e190a",
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "Countries List",
      "func": "let countries = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n   \n   countries.push(obj.name)
\n});\nreturn {payload: countries};",
      "outputs": 1,
      "noerr": 0,
      "initialize": "",
      "finalize": "",
      "libs": [],
      "x": 810,
      "y": 640,
      "wires": [
          [
              "2fd39e061c513e06",
              "afc48a108d06cbec"
          ]
      ]
  },
  {
      "id": "4b8d438f2b310bad",
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "Locations List",
```

```
        "func": "let locations = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n    \n    locations.push(obj.locati
on) \n});\nreturn {payload: locations};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 810,
        "y": 730,
        "wires": [
            [
                "76a9f7376b4f7b40",
                "c8c07044e5f01757"
            ]
        ]
    },
    {
        "id": "29fdc6c636e4e1ac",
        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "Descriptions List",
        "func": "let descriptions = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n    \n    descriptions.push(obj.des
cription) \n});\nreturn {payload: descriptions};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 820,
        "y": 1000,
        "wires": [
            [
                "8c711c3983a0ff14",
                "6b14b2d72a97d924"
            ]
        ]
    },
    {
        "id": "8c711c3983a0ff14",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
```

```
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1320,
        "y": 1090,
        "wires": []
    },
    {
        "id": "c23704aa878db80c",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": true,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1320,
        "y": 860,
        "wires": []
    },
    {
        "id": "5a3923418fad7ec4",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": true,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1320,
        "y": 900,
        "wires": []
    },
    {
        "id": "76a9f7376b4f7b40",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
```

```
      "complete": "false",
      "statusVal": "",
      "statusType": "auto",
      "x": 1020,
      "y": 720,
      "wires": []
    },
    {
      "id": "14641970c1bb8ad1",
      "type": "debug",
      "z": "9379173093fa6ab5",
      "name": "",
      "active": false,
      "tosidebar": true,
      "console": false,
      "tostatus": false,
      "complete": "payload",
      "targetType": "msg",
      "statusVal": "",
      "statusType": "auto",
      "x": 800,
      "y": 480,
      "wires": []
    },
    {
      "id": "08f2994772e893ea",
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "First Updated ",
      "func": "let firstupdate = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n   \n   firstupdate.push(obj.firs
tUpdated) \n});\nreturn {payload: firstupdate};",
      "outputs": 1,
      "noerr": 0,
      "initialize": "",
      "finalize": "",
      "libs": [],
      "x": 810,
      "y": 180,
      "wires": [
        [
            "19874b84f1826477",
            "937b0219068381f9"
        ]
      ]
    },
    {
      "id": "62a182a8057cd856",
```

```
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "Last Updated",
      "func": "let lastupdate = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n   \n   lastupdate.push(obj.lastU
pdated) \n});\nreturn {payload: lastupdate};",
      "outputs": 1,
      "noerr": 0,
      "initialize": "",
      "finalize": "",
      "libs": [],
      "x": 810,
      "y": 310,
      "wires": [
          [
              "bc390e0ea80953a9",
              "51cf442a79675fa0"
          ]
      ]
    },
    {
      "id": "bc390e0ea80953a9",
      "type": "debug",
      "z": "9379173093fa6ab5",
      "name": "",
      "active": false,
      "tosidebar": true,
      "console": false,
      "tostatus": false,
      "complete": "payload",
      "targetType": "msg",
      "statusVal": "",
      "statusType": "auto",
      "x": 1020,
      "y": 380,
      "wires": []
    },
    {
      "id": "19874b84f1826477",
      "type": "debug",
      "z": "9379173093fa6ab5",
      "name": "",
      "active": false,
      "tosidebar": true,
      "console": false,
      "tostatus": false,
      "complete": "payload",
      "targetType": "msg",
```

```json
            "statusVal": "",
            "statusType": "auto",
            "x": 1020,
            "y": 240,
            "wires": []
    },
    {
            "id": "5390071579d41003",
            "type": "debug",
            "z": "9379173093fa6ab5",
            "name": "",
            "active": true,
            "tosidebar": true,
            "console": false,
            "tostatus": false,
            "complete": "false",
            "statusVal": "",
            "statusType": "auto",
            "x": 800,
            "y": 810,
            "wires": []
    },
    {
            "id": "978e4a6414519c76",
            "type": "function",
            "z": "9379173093fa6ab5",
            "name": "Parameter Value",
            "func": "let results =
msg.payload.results[0].measurements[0].value\nreturn {payload: results};",
            "outputs": 1,
            "noerr": 0,
            "initialize": "",
            "finalize": "",
            "libs": [],
            "x": 820,
            "y": 770,
            "wires": [
                [
                    "c4027492eb96cd9a",
                    "f1f49c7a307a6e61"
                ]
            ]
    },
    {
            "id": "c4027492eb96cd9a",
            "type": "debug",
            "z": "9379173093fa6ab5",
            "name": "",
```

```
      "active": false,
      "tosidebar": true,
      "console": false,
      "tostatus": false,
      "complete": "false",
      "statusVal": "",
      "statusType": "auto",
      "x": 1020,
      "y": 810,
      "wires": []
  },
  {
      "id": "d45bbbad048abfef",
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "",
      "func": "var ubi_payload = {\"Units\" : {\"value\" : 0 , \"context\" :
{\"Unit Type 1\":\"ppm\", \"Unit Type 2\":\"µg/m³\",\"Unit Type
3\":\"particles/cm³\"}}};\nreturn {\"payload\":ubi_payload};",
      "outputs": 1,
      "noerr": 0,
      "initialize": "",
      "finalize": "",
      "libs": [],
      "x": 1120,
      "y": 940,
      "wires": [
          [
              "5a3923418fad7ec4",
              "5d2fd54b01e25375"
          ]
      ]
  },
  {
      "id": "fd9e301aa68c6b1a",
      "type": "debug",
      "z": "9379173093fa6ab5",
      "name": "",
      "active": true,
      "tosidebar": true,
      "console": false,
      "tostatus": false,
      "complete": "false",
      "statusVal": "",
      "statusType": "auto",
      "x": 1320,
      "y": 1000,
      "wires": []
```

```
        },
        {
            "id": "6b14b2d72a97d924",
            "type": "function",
            "z": "9379173093fa6ab5",
            "name": "",
            "func": "var ubi_payload = {\"Descriptions\" : {\"value\" : 1 ,
\"context\" : {\"Description 1\": \"Nitrogen Oxides concentration\",
\"Description 2\": \"Particulate matter less than 4 micrometers in diameter
mass concentration\",\"Description 3\": \"PM2.5 count\"}}};\nreturn
{\"payload\":ubi_payload}; ",
            "outputs": 1,
            "noerr": 0,
            "initialize": "",
            "finalize": "",
            "libs": [],
            "x": 1120,
            "y": 1000,
            "wires": [
                [
                    "fd9e301aa68c6b1a",
                    "5ecac0ed97f90eba"
                ]
            ]
        },
        {
            "id": "8a6a9b94504e9bc6",
            "type": "debug",
            "z": "9379173093fa6ab5",
            "name": "",
            "active": false,
            "tosidebar": true,
            "console": false,
            "tostatus": false,
            "complete": "false",
            "statusVal": "",
            "statusType": "auto",
            "x": 1320,
            "y": 1140,
            "wires": []
        },
        {
            "id": "58ae06fc6a2145f4",
            "type": "function",
            "z": "9379173093fa6ab5",
            "name": "",
```

```
        "func": "var ubi_payload3 = {\"AQ Component Names\" :{\"value\" : 3 ,
\"context\" : {\"Component 1\":\"pm10\", \"Component 2\":\"so\",\"Component
3\":\"co\"}}};\nreturn {\"payload\":ubi_payload3};\n\n",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 1120,
        "y": 1140,
        "wires": [
            [
                "8a6a9b94504e9bc6",
                "dad32bf7beb301ce"
            ]
        ]
    },
    {
        "id": "c8c07044e5f01757",
        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "",
        "func": "var ubi_payload1 = {\"Units\" : {\"Unit Type 1\":\"abc\",
\"Unit Type 2\":\"def\",\"Unit Type 3\":\"abc\", \"Unit Type
4\":\"def\"}};\nreturn {\"payload\":ubi_payload1};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 1010,
        "y": 680,
        "wires": [
            [
                "d017dfedac890430"
            ]
        ]
    },
    {
        "id": "d017dfedac890430",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
```

```
        "statusVal": "",
        "statusType": "auto",
        "x": 1210,
        "y": 640,
        "wires": []
    },
    {
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        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "",
        "func": "var ubi_payload1 = {\"Units\" : {\"Unit Type 1\":\"abc\",
\"Unit Type 2\":\"def\",\"Unit Type 3\":\"abc\", \"Unit Type
4\":\"def\"}};\nreturn {\"payload\":ubi_payload1};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 1010,
        "y": 590,
        "wires": [
            [
                "2b05e7c5d62ca9bf"
            ]
        ]
    },
    {
        "id": "2b05e7c5d62ca9bf",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1210,
        "y": 550,
        "wires": []
    },
    {
        "id": "937b0219068381f9",
        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "",
```

```
        "func": "var ubi_payload1 = {\"Units\" : {\"Unit Type 1\":\"abc\",
\"Unit Type 2\":\"def\",\"Unit Type 3\":\"abc\", \"Unit Type
4\":\"def\"}};\nreturn {\"payload\":ubi_payload1};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 1010,
        "y": 180,
        "wires": [
            [
                "942c3c47d9df1a2a"
            ]
        ]
    },
    {
        "id": "942c3c47d9df1a2a",
        "type": "debug",
        "z": "9379173093fa6ab5",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1210,
        "y": 130,
        "wires": []
    },
    {
        "id": "51cf442a79675fa0",
        "type": "function",
        "z": "9379173093fa6ab5",
        "name": "",
        "func": "var ubi_payload1 = {\"Units\" : {\"Unit Type 1\":\"abc\",
\"Unit Type 2\":\"def\",\"Unit Type 3\":\"abc\", \"Unit Type
4\":\"def\"}};\nreturn {\"payload\":ubi_payload1};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 1010,
        "y": 310,
        "wires": [
```

```
        [
            "2ecfe1aa06a1a4c4"
        ]
    ]
},
{
    "id": "2ecfe1aa06a1a4c4",
    "type": "debug",
    "z": "9379173093fa6ab5",
    "name": "",
    "active": false,
    "tosidebar": true,
    "console": false,
    "tostatus": false,
    "complete": "false",
    "statusVal": "",
    "statusType": "auto",
    "x": 1210,
    "y": 270,
    "wires": []
},
{
    "id": "a2e53461c2916d34",
    "type": "function",
    "z": "9379173093fa6ab5",
    "name": "",
    "func": "var ubi_payload1 = {\"Units\" : {\"Unit Type 1\":\"abc\",
\"Unit Type 2\":\"def\",\"Unit Type 3\":\"abc\", \"Unit Type
4\":\"def\"}};\nreturn {\"payload\":ubi_payload1};",
    "outputs": 1,
    "noerr": 0,
    "initialize": "",
    "finalize": "",
    "libs": [],
    "x": 1010,
    "y": 440,
    "wires": [
        [
            "5f6d0ad5dd00bdb8"
        ]
    ]
},
{
    "id": "5f6d0ad5dd00bdb8",
    "type": "debug",
    "z": "9379173093fa6ab5",
    "name": "",
    "active": false,
```

```
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 1210,
        "y": 400,
        "wires": []
    },
    {
        "id": "5d2fd54b01e25375",
        "type": "ubidots_out",
        "z": "9379173093fa6ab5",
        "name": "",
        "token": "BBFF-rRDmR0kFvmiMQWaGo4Cju0M7FTtzAl",
        "label_device": "",
        "device_label": "data",
        "tier": "business",
        "tls_checkbox": true,
        "x": 1320,
        "y": 940,
        "wires": []
    },
    {
        "id": "5ecac0ed97f90eba",
        "type": "ubidots_out",
        "z": "9379173093fa6ab5",
        "name": "",
        "token": "BBFF-rRDmR0kFvmiMQWaGo4Cju0M7FTtzAl",
        "label_device": "",
        "device_label": "data",
        "tier": "business",
        "tls_checkbox": true,
        "x": 1320,
        "y": 1040,
        "wires": []
    },
    {
        "id": "dad32bf7beb301ce",
        "type": "ubidots_out",
        "z": "9379173093fa6ab5",
        "name": "",
        "token": "BBFF-rRDmR0kFvmiMQWaGo4Cju0M7FTtzAl",
        "label_device": "",
        "device_label": "data",
        "tier": "business",
        "tls_checkbox": true,
```

```
      "x": 1320,
      "y": 1190,
      "wires": []
  },
  {
      "id": "417ef0b2ed3b07dd",
      "type": "ubidots_out",
      "z": "9379173093fa6ab5",
      "name": "",
      "token": "BBFF-N32uOJ6Pyb4q9dMXPrRy60AW7HWmUV",
      "label_device": "",
      "device_label": "value",
      "tier": "educational",
      "tls_checkbox": true,
      "x": 1240,
      "y": 770,
      "wires": []
  },
  {
      "id": "f1f49c7a307a6e61",
      "type": "function",
      "z": "9379173093fa6ab5",
      "name": "",
      "func": "var ubi_payload = {\"paramater_value\":msg.payload}\nreturn
{\"payload\":ubi_payload};",
      "outputs": 1,
      "noerr": 0,
      "initialize": "",
      "finalize": "",
      "libs": [],
      "x": 1010,
      "y": 770,
      "wires": [
          [
              "417ef0b2ed3b07dd"
          ]
      ]
  },
  {
      "id": "7f68bc687beda490",
      "type": "inject",
      "z": "d494401dbd059004",
      "name": "",
      "props": [
          {
              "p": "payload"
          },
          {
```

```
                "p": "topic",
                "vt": "str"
            }
        ],
        "repeat": "",
        "crontab": "",
        "once": false,
        "onceDelay": 0.1,
        "topic": "",
        "payload": "",
        "payloadType": "date",
        "x": 240,
        "y": 170,
        "wires": [
            [
                "8f298a590d16a73f"
            ]
        ]
    },
    {
        "id": "3e7dda90acf97286",
        "type": "debug",
        "z": "d494401dbd059004",
        "name": "",
        "active": true,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "payload",
        "targetType": "msg",
        "statusVal": "",
        "statusType": "auto",
        "x": 810,
        "y": 420,
        "wires": []
    },
    {
        "id": "8f298a590d16a73f",
        "type": "openaq-latest",
        "z": "d494401dbd059004",
        "aqconfig": "",
        "location": "",
        "city": "Roma",
        "country": "IT",
        "latitude": "",
        "longitude": "",
        "radius": 2500,
        "orderby_location": true,
```

```
        "sort_location": "asc",
        "orderby_city": false,
        "sort_city": null,
        "orderby_country": false,
        "sort_country": null,
        "orderby_distance": false,
        "sort_distance": null,
        "parameter": "",
        "hasGeo": false,
        "limit": 100,
        "page": 1,
        "name": "",
        "x": 230,
        "y": 260,
        "wires": [
            [
                "a1b7998d9154ef2a"
            ]
        ]
    },
    {
        "id": "a1b7998d9154ef2a",
        "type": "function",
        "z": "d494401dbd059004",
        "name": "",
        "func": "let locations = [];\nlet results =
msg.payload.results\nresults.forEach(obj=>{\n    \n    locations.push(obj.loca
tion)\n})\nreturn {options: locations};",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 240,
        "y": 350,
        "wires": [
            [
                "b01c8e3675735cb0",
                "31843113a01c1ff9"
            ]
        ]
    },
    {
        "id": "f5f2e73b5a837fa0",
        "type": "function",
        "z": "d494401dbd059004",
        "name": "",
        "func": "let location = msg.payload;\nreturn{location:location};",
```

```json
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 610,
        "y": 350,
        "wires": [
            [
                "3e7dda90acf97286",
                "c2eec6fe1305da4c"
            ]
        ]
    },
    {
        "id": "b01c8e3675735cb0",
        "type": "ui_dropdown",
        "z": "d494401dbd059004",
        "name": "",
        "label": "",
        "tooltip": "",
        "place": "Select option",
        "group": "3875479a2e2fbaeb",
        "order": 0,
        "width": "6",
        "height": "5",
        "passthru": true,
        "multiple": false,
        "options": [],
        "payload": "",
        "topic": "topic",
        "topicType": "msg",
        "className": "",
        "x": 440,
        "y": 350,
        "wires": [
            [
                "f5f2e73b5a837fa0"
            ]
        ]
    },
    {
        "id": "31843113a01c1ff9",
        "type": "debug",
        "z": "d494401dbd059004",
        "name": "",
        "active": false,
        "tosidebar": true,
```

```
    "console": false,
    "tostatus": false,
    "complete": "false",
    "statusVal": "",
    "statusType": "auto",
    "x": 450,
    "y": 420,
    "wires": []
},
{

    "id": "c2eec6fe1305da4c",
    "type": "openaq-latest",
    "z": "d494401dbd059004",
    "aqconfig": "",
    "location": "",
    "city": "Roma",
    "country": "IT",
    "latitude": "",
    "longitude": "",
    "radius": 2500,
    "orderby_location": true,
    "sort_location": "asc",
    "orderby_city": false,
    "sort_city": null,
    "orderby_country": false,
    "sort_country": null,
    "orderby_distance": false,
    "sort_distance": null,
    "parameter": "",
    "hasGeo": false,
    "limit": 100,
    "page": 1,
    "name": "",
    "x": 790,
    "y": 350,
    "wires": [
        [
            "d0e6d326caeeb854",
            "b633fcda4d49a5b1"
        ]
    ]
},
{

    "id": "d0e6d326caeeb854",
    "type": "debug",
    "z": "d494401dbd059004",
    "name": "",
    "active": true,
```

```
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "true",
        "targetType": "full",
        "statusVal": "",
        "statusType": "auto",
        "x": 940,
        "y": 300,
        "wires": []
    },
    {
        "id": "b633fcda4d49a5b1",
        "type": "link out",
        "z": "d494401dbd059004",
        "name": "Data",
        "mode": "link",
        "links": [
            "d721a0401884c870"
        ],
        "x": 905,
        "y": 350,
        "wires": []
    },
    {
        "id": "d721a0401884c870",
        "type": "link in",
        "z": "503668422e078d86",
        "name": "",
        "links": [
            "b633fcda4d49a5b1"
        ],
        "x": 215,
        "y": 80,
        "wires": [
            [
                "fb02cfef0f517cf5",
                "7bd4540ebcda1604"
            ]
        ]
    },
    {
        "id": "7bd4540ebcda1604",
        "type": "debug",
        "z": "503668422e078d86",
        "name": "",
        "active": false,
        "tosidebar": true,
```

```
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 340,
        "y": 30,
        "wires": []
    },
    {
        "id": "fb02cfef0f517cf5",
        "type": "function",
        "z": "503668422e078d86",
        "name": "",
        "func": "let results = msg.payload.results[0]\nlet measurements =
results.measurements\n\nlet obj = {}\nobj.data = [[]]\nobj.labels =
[]\nobj.series =
[\"value\"];\n\nmeasurements.forEach(O=>{\n    obj.data[0].push(O.value);\n    o
bj.labels.push(O.parameter)\n});\nreturn {payload : [obj], topic:
msg.topic};\n",
        "outputs": 1,
        "noerr": 0,
        "initialize": "",
        "finalize": "",
        "libs": [],
        "x": 330,
        "y": 80,
        "wires": [
            [
                "fab14d81d10d812a",
                "d6500bbd5606058d"
            ]
        ]
    },
    {
        "id": "fab14d81d10d812a",
        "type": "debug",
        "z": "503668422e078d86",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "true",
        "targetType": "full",
        "statusVal": "",
        "statusType": "auto",
        "x": 480,
```

```
        "y": 80,
        "wires": []
    },
    {
        "id": "d6500bbd5606058d",
        "type": "link out",
        "z": "503668422e078d86",
        "name": "Data for Dashboard",
        "mode": "link",
        "links": [
            "3a5c8068828debe2"
        ],
        "x": 445,
        "y": 130,
        "wires": []
    },
    {
        "id": "a73c070a26605c06",
        "type": "debug",
        "z": "cc2e19e57c2f8442",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "false",
        "statusVal": "",
        "statusType": "auto",
        "x": 240,
        "y": 60,
        "wires": []
    },
    {
        "id": "3a5c8068828debe2",
        "type": "link in",
        "z": "cc2e19e57c2f8442",
        "name": "Data",
        "links": [
            "d6500bbd5606058d"
        ],
        "x": 75,
        "y": 100,
        "wires": [
            [
                "a73c070a26605c06",
                "84e54350027f9c77",
                "96ad253c151359f9",
                "3ad4cd547b2c38d2"
```

```
                ]
            ]
        },
        {
            "id": "84e54350027f9c77",
            "type": "ui_chart",
            "z": "cc2e19e57c2f8442",
            "name": "",
            "group": "2998ee281704e555",
            "order": 1,
            "width": "6",
            "height": "6",
            "label": "chart",
            "chartType": "bar",
            "legend": "true",
            "xformat": "HH:mm:ss",
            "interpolate": "linear",
            "nodata": "",
            "dot": false,
            "ymin": "0",
            "ymax": "200",
            "removeOlder": 1,
            "removeOlderPoints": "",
            "removeOlderUnit": "3600",
            "cutout": 0,
            "useOneColor": false,
            "useUTC": false,
            "colors": [
                "#1f77b4",
                "#aec7e8",
                "#ff7f0e",
                "#2ca02c",
                "#98df8a",
                "#d62728",
                "#ff9896",
                "#9467bd",
                "#c5b0d5"
            ],
            "outputs": 1,
            "useDifferentColor": false,
            "className": "",
            "x": 220,
            "y": 100,
            "wires": [
                []
            ]
        },
        {
```

```
    "id": "96ad253c151359f9",
    "type": "ui_toast",
    "z": "cc2e19e57c2f8442",
    "position": "prompt",
    "displayTime": "3",
    "highlight": "",
    "sendall": true,
    "outputs": 1,
    "ok": "OK",
    "cancel": "Cancel",
    "raw": true,
    "className": "Check Graphs",
    "topic": "Data Levels Updated",
    "name": "Pop Up",
    "x": 230,
    "y": 160,
    "wires": [
        []
    ]
},
{
    "id": "3ad4cd547b2c38d2",
    "type": "ui_text",
    "z": "cc2e19e57c2f8442",
    "group": "3875479a2e2fbaeb",
    "order": 1,
    "width": 0,
    "height": 0,
    "name": "",
    "label": "Please select the location from below:",
    "format": "",
    "layout": "col-center",
    "className": "",
    "x": 320,
    "y": 200,
    "wires": []
},
{
    "id": "de49e2535046d932",
    "type": "remote-access",
    "z": "cc2e19e57c2f8442",
    "confignode": "99e9f651b03faa0b",
    "name": "",
    "verbose": 0,
    "x": 110,
    "y": 340,
    "wires": [
        [
```

```
                "84e54350027f9c77"
            ]
        ]
    }
]
```

2. <u>CSV File:</u>

Since our project is following a different approach of extracting live data from a constantly updating database, therefore we have attached the following links, the first link is to the OpenAq website from where we can either extract specific air quality data in either CSV file format or API token to access the entire database. The second link is to directly connect OpenAq to NodeRed where the nodes will be added with latest information and will be constantly updated.

https://openaq.org/#/
https://flows.nodered.org/node/node-red-contrib-openaq

3. <u>CSV File Link:</u>

Command to install the latest OpenAq nodes to NodeRed:

```
$ npm install node-red-contrib-openaq
```

4. <u>UBI dot Public Link to dash Board:</u>

Link to access our air quality monitoring dashboard on UBI Dots:

https://stem.ubidots.com/app/dashboards/public/dashboard/EJrv_hBcxdAISE5U8o9tcuRbeDUvw4i_0omrINY2xw8