

# The Meadow System: Overview

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# The Meadow System

The Meadow system is an infrastructure for defining and executing *workflows over devices and events*.

In particular,

- Provides a **namespace for devices**.
- Provides a **namespace for events and event types**.
- Provides a **language** for defining workflows.
- Provides a **runtime** for execution of workflow definitions.

# Device Namespace

The device namespace of the Meadow system is an infinite space of **hierarchical names**: e.g. `person.cj.fitbit`.

The system allows **registration of devices**.

- No authoritative registry that manages names.
- Only name conflict will be checked at the time of registration.

A name can denote either a device or a *group* of devices.

# Event Namespace

The event namespace is an infinite space of **hierarchical names**: e.g. `person.cj.fitbit.RechargeNeeded`.

The system allows **registration of events**.

- No authoritative registry that manages names.
- Only name conflict will be checked at the time of registration.
- The namespaces of device and events must not overlap.

qA name can denote either a event or a *group* of events.

# Workflow Definition

The **Meadowview** language allows to define *agents*, *events*, and *workflows*.

An **agent** represents a “device” which can participate in a workflow.

Through **events**, agents can be correlated in a workflow.

An **workflow definition** is a program written in Meadowview, which defines how agents work together to accomplish the given task.

# Workflow Execution

The **workflow runtime** can *instantiate* a workflow definition into a **workflow process** using actual devices.

The runtime is responsible for two major activities:

- **dynamically scheduling** of device processes.
- **routing of data** between participating devices.

# Example: Device Namespace

An C-API for device/group registration is provided.

```
int mv_add_device(char *device_name);  
int mv_remove_device(char *device_name);  
int mv_add_group(char *group_name);  
int mv_remove_group(char *group_name);  
int mv_group_add_device(char *group_name, char *device_name);
```

## Example: Workflow Definition

An example code in Meadowview:

```
namespace person.cj2005.fitbit {
  event DeviceIdRequest;
  event DeviceIdReply {
    int device_id;
  };
  event DeviceCommand {
    int command, data;
  };

  process P(DeviceIdRequest e) {
    Device sender = e.sender();
    sender.send(sender, DeviceIdReply(self.getId()));
  }

  process Q(DeviceCommand e) {
    if (e.command == 1)
      self.send(cmd1.run, e.data);
    ...
  };
}
```



# Example: Workflow Execution

