

1. PROJECT

ROOT_OBJECTS

```
--|examples_AADL/Common\Data_Model|--,  
--|examples_AADL/Isolette\Isolette_Properties|--,  
--|examples_AADL/Isolette\Monitor_DataTypes|--,  
--|examples_AADL/Isolette\Regulator_DataTypes|--,  
--|examples_AADL/Isolette\Isolette_DataTypes|--,  
--|examples_AADL/Isolette\Isolette|--
```

END

1.1. Project Description

SYSTEM MODELING

This example shows how to use Stood project and design concepts to elaborate a well structured system/software architecture from textual specifications.

The PROJECT section aims at well separating the "System to Design" from its environment

According to the Requirements Engineering Management Handbook, DOT/FAA/AR-08/32, June 2009,

"One way to define the system boundary is to view the system as a component that interacts with its environment through a set of monitored and controlled variables"

This is shown in the "Project Sketch" sub-section.

"The monitored variables represent quantities in the environment that the system responds to, while the controlled variables represent quantities in the environment that the system will affect. For example, monitored values might be the actual altitude of an aircraft and its airspeed, while controlled variables might be the position of a control surface, such as an aileron or the displayed value of the altitude on the primary flight display. Conceptually, the monitored and controlled variables exist in the environment outside of the system and would continue to exist even if the system were eliminated. The purpose of the system is to maintain a relationship between the monitored and controlled variables that achieves the system goals. The definition of the monitored and controlled variables and their attributes define the boundary of the system."

A list of Monitored and Controlled variables is provided in the "Project Table" sub-section.

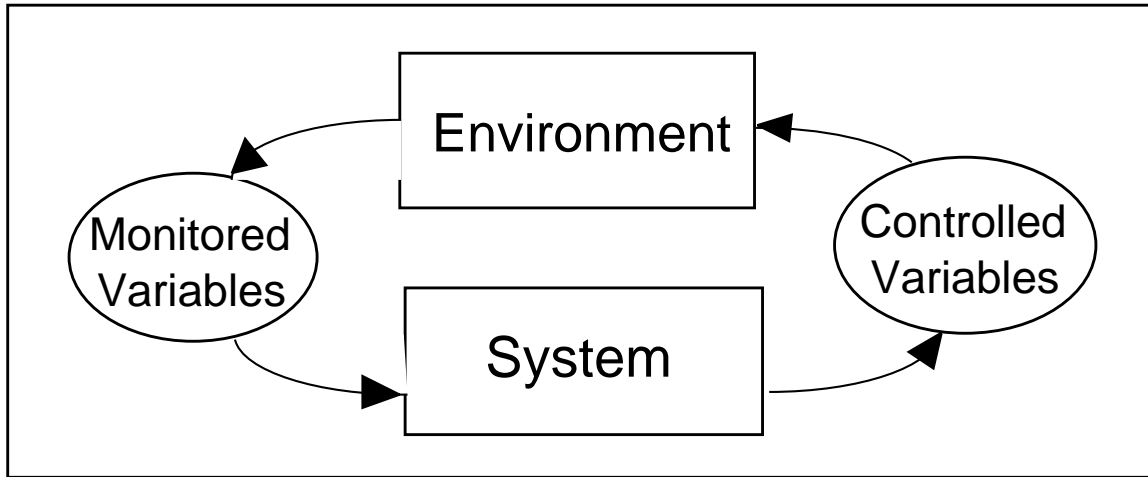
A list of Requirements that must be covered by the design entities can be loaded into the tool thanks to the Requirements editor. Once loaded, this list is displayed in the "List of Requirements" sub-section.

Note that this section is read-only, any change to the list must be performed through the Requirements editor.

The two last sub-sections are also read-only and provide the current state of the Design Tree (hierarchy of components) and the Inheritance Tree, when appropriate. With Stood, Inheritance Tree is only provided for AADL Data component classifiers specified in an AADL Package design.

The diagram associated to the PROJECT shows the main "System to Design" (Isolette) that is graphically represented by an AADL System and corresponds to the root of the instance hierarchy. The diagram also contains a set of AADL Packages identifying the libraries of AADL Data component classifiers that are used by the Isolette model.

1.2. Project Sketch



1.3. Project Table

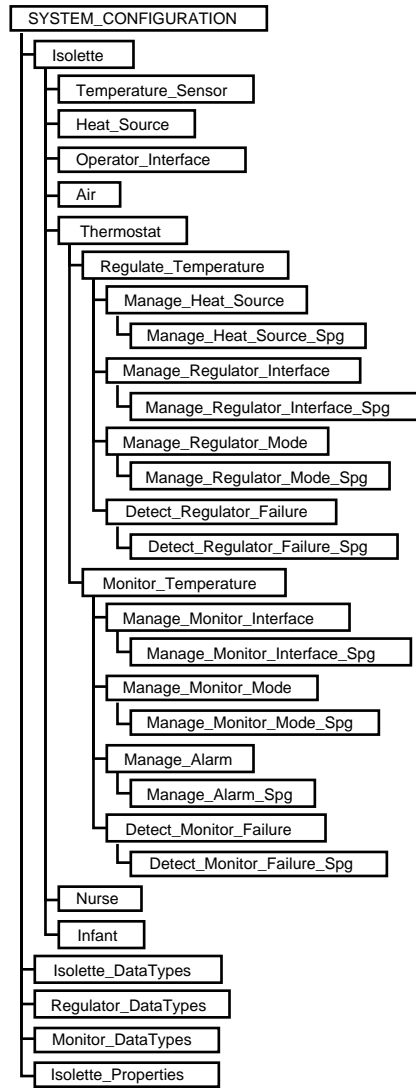
	Name	Type	Physical Interpretation
	Current Temperature	Monitored	Current air temperature inside Isolette
	Operator Settings		Thermostat settings provided by the operator
	Desired Temperature Range		Desired range of Isolette temperature
	Lower Desired Temperature	Monitored	Lower value of the Desired Temperature Range
	Upper Desired Temperature	Monitored	Upper value of the Desired Temperature Range
	Operator Feedback		Information provided back to the operator
	Display Temperature	Controlled	Displayed temperature of the air in Isolette
	Heat Control	Controlled	Command to turn the heat source on or off

1.4. List of Requirements

- REQ-MA-1
- REQ-MA-2
- REQ-MA-3
- REQ-MA-4
- REQ-MA-5
- REQ-MHS-1
- REQ-MHS-2
- REQ-MHS-3

REQ-MHS-4
REQ-MHS-5
REQ-MMI-1
REQ-MMI-2
REQ-MMI-3
REQ-MMI-4
REQ-MMI-5
REQ-MMI-6
REQ-MMI-7
REQ-MRI-1
REQ-MRI-2
REQ-MRI-3
REQ-MRI-4
REQ-MRI-5
REQ-MRI-6
REQ-MRI-7
REQ-MRI-8
REQ-MRI-9
REQ-MT-1
REQ-MT-2
REQ-RT-1
REQ-RT-2
REQ-RT-3
REQ-TH-1
REQ-TH-2
REQ-TH-3
REQ-TH-4
REQ-TH-5

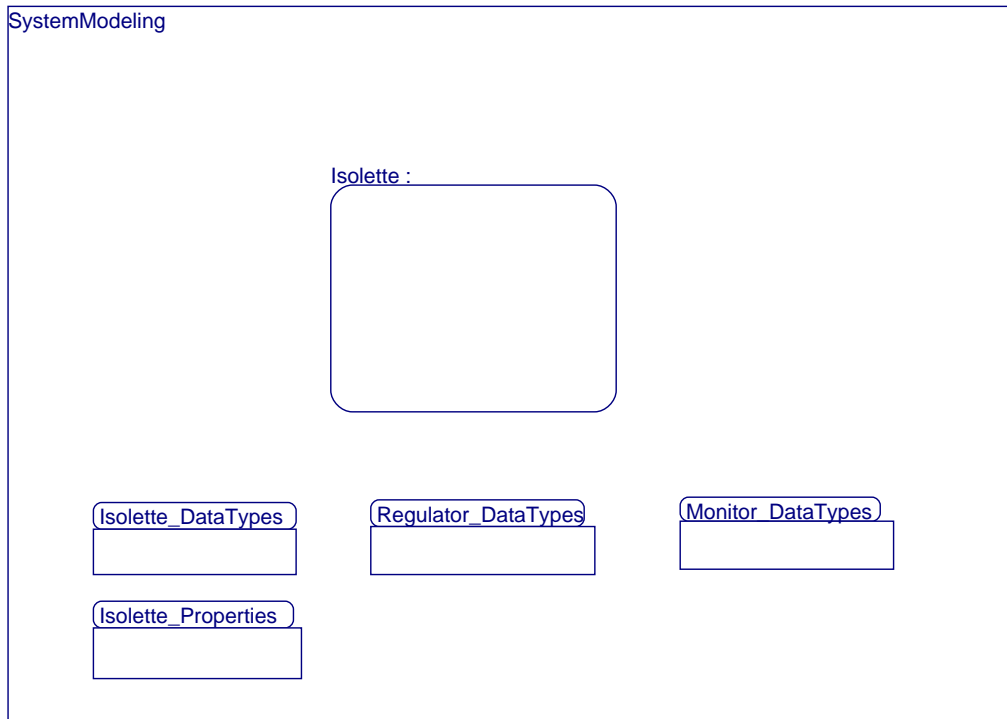
1.5. Design Tree



1.6. Inheritance Tree



1.7. AADL Diagram



2. SYSTEM Isolette IS

2.1. DESCRIPTION

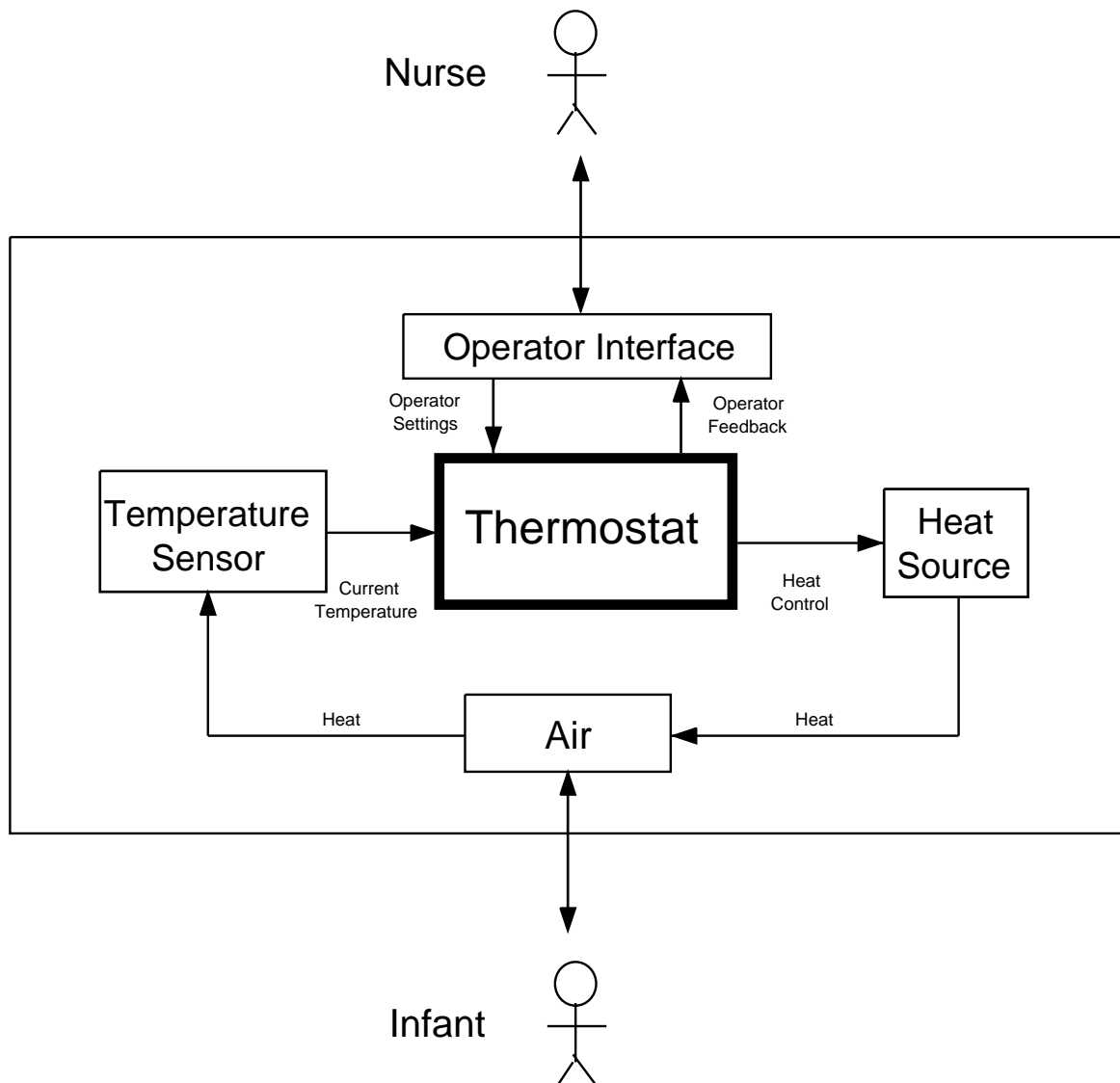
2.1.1. PROBLEM

2.1.1.1. Statement of the Problem (text)

The system being specified is the Thermostat of an Isolette. An Isolette is an incubator for an Infant that provides controlled temperature, humidity, and oxygen (if necessary). Isolettes are used extensively in Neonatal Intensive Care Units for the care of premature infants.

The purpose of the Isolette Thermostat is to maintain the air temperature of an Isolette within a desired range. It senses the Current Temperature of the Isolette and turns the Heat Source on and off to warm the air as needed. If the temperature falls too far below or rises too far above the Desired Temperature Range, it activates an alarm to alert the Nurse. The system allows the Nurse to set the Desired Temperature Range and to set the Alarm Temperature Range outside the Desired Temperature Range of which the alarm should be activated.

2.1.1.2. Sketch of the Problem



2.1.1.3. Referenced Documents

[1] This model is directly inspired from the ISOLETTE THERMOSTAT EXAMPLE provided in APPENDIX A of the Requirements Management Handbook, DOT/FAA/AR-08/32, June 2009.

Authors: David L. Lempia and Steven P. Miller, Rockwell Collins, Inc.

[2] This model is implemented with the Architecture Analysis and Design Language (AADL), SAE-AS5506B, Sept 2012

[3] Design choices are inspired by the corresponding example provided by the Requirements Definition and Analysis Language Annex draft v161.

2.1.2. SOLUTION

2.1.2.1. General Strategy (text)

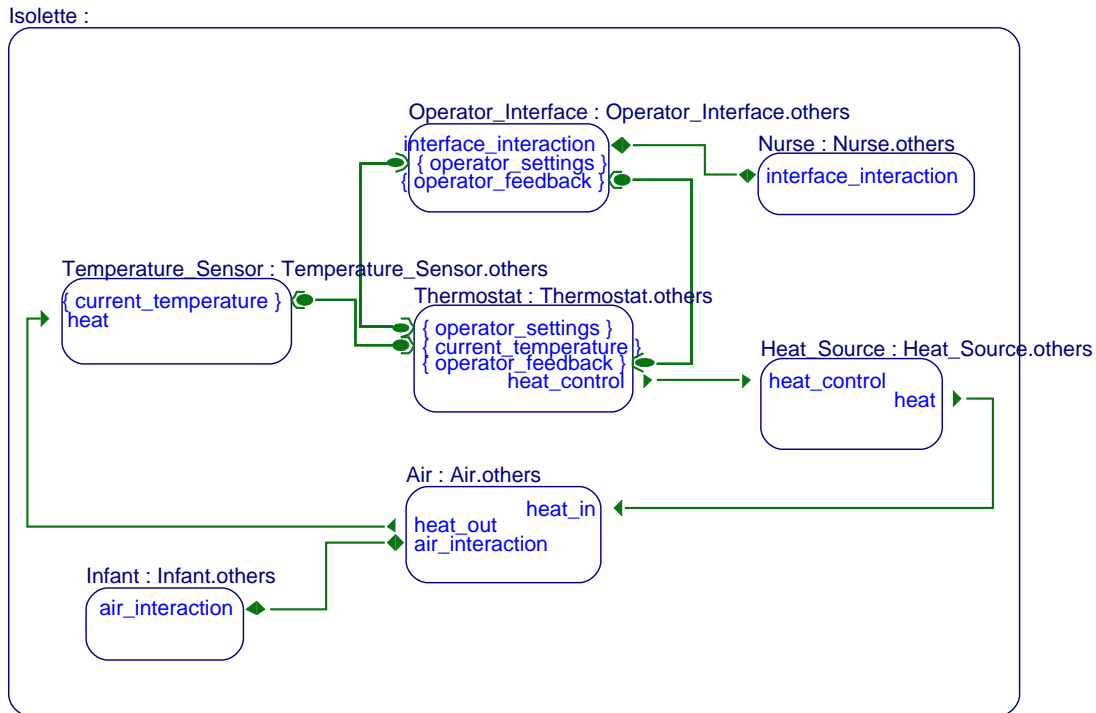
The Thermostat interacts directly with three entities that are part of the Isolette:

- The Temperature Sensor provides the Current Temperature of the air in the Isolette to the Thermostat.
- The Heat Source heats the Air in the Isolette. It is turned on and off by the Heat Control.
- The Operator Interface provides the Operator Settings for the Thermostat and receives Operator Feedback from the Thermostat.

The Thermostat also interacts indirectly with other entities outside of the Isolette:

- The Nurse who uses the Operator Interface to enter the Operator Settings and view the Operator Feedback.
- The Air in the Isolette.
- The Infant that is placed in the Isolette and is warmed by the Air.

2.1.2.2. AADL Diagram



2.2. TYPE

2.2.1. FEATURE GROUPS

2.2.2. FEATURES

2.2.3. PROPERTIES

2.2.3.1. Predeclared Deployment Properties

2.2.3.2. Predeclared Thread Properties

2.2.3.3. Predeclared Timing Properties

2.2.3.4. Predeclared Communication properties

2.2.3.5. Predeclared Memory Properties

2.2.3.6. Predeclared Programming Properties

2.2.3.7. Predeclared Modeling Properties

2.2.3.8. Data Modeling Annex Properties

2.2.3.9. ARINC 653 Annex Properties

2.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Heat; Heat_Control; Interface_Interaction; Air_Interaction; Lower_Desired_Temp_Valu  
Temp_Status; Upper_Desired_Temp_Value; Lower_Alarm_Temp_Value; Upper_Alarm_Temp_Value;  
Current_Temp_Value; Regulator_Status; Display_Temperature; Monitor_Status; Alarm;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE  
OBJECT Monitor_DataTypes;  
  TYPES  
    Monitor_Mode; Lower_Alarm_Temp; Upper_Alarm_Temp;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE  
OBJECT Regulator_DataTypes;  
  TYPES  
    Lower_Desired_Temp; Upper_Desired_Temp; Regulator_Mode;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE
```

2.4. IMPLEMENTATION

2.4.1. SUBCOMPONENTS

```
Temperature_Sensor;  
Heat_Source;  
Operator_Interface;  
Air;  
Thermostat;  
Nurse;  
Infant;
```

2.4.2. CONNECTIONS

2.4.3. PROPERTIES

2.4.4. BEHAVIOR

2.4.4.1. MODES

2.4.4.2. TRANSITIONS

2.4.4.3. BEHAVIOR ANNEX

2.4.4.4. ERROR ANNEX

3. SYSTEM Temperature_Sensor IS

3.1. DESCRIPTION

3.1.1. PROBLEM

3.1.2. SOLUTION

3.2. TYPE

3.2.1. FEATURE GROUPS

3.2.1.1. current_temperature

3.2.1.1.1. Feature Group Contents

```
{current_temperature : val status}
```

3.2.1.1.2. Predeclared Feature Group Properties

3.2.2. FEATURES

3.2.2.1. val

3.2.2.1.1. Feature Declaration

```
val(Flow : out Current_Temp_Value);
```

3.2.2.1.2. Predeclared Feature Properties

3.2.2.2. status

3.2.2.2.1. Feature Declaration

```
status(Flow : out Temp_Status);
```

3.2.2.2.2. Predeclared Feature Properties

3.2.2.3. heat

3.2.2.3.1. Feature Declaration

```
heat(Flow : in Heat);
```

3.2.2.3.2. Predeclared Feature Properties

3.2.3. PROPERTIES

3.2.3.1. Predeclared Deployment Properties

3.2.3.2. Predeclared Thread Properties

- 3.2.3.3. Predeclared Timing Properties**
- 3.2.3.4. Predeclared Communication properties**
- 3.2.3.5. Predeclared Memory Properties**
- 3.2.3.6. Predeclared Programming Properties**
- 3.2.3.7. Predeclared Modeling Properties**
- 3.2.3.8. Data Modeling Annex Properties**
- 3.2.3.9. ARINC 653 Annex Properties**

3.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Heat;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE
```

3.4. IMPLEMENTATION

3.4.1. PROPERTIES

3.4.2. BEHAVIOR

3.4.2.1. MODES

3.4.2.2. TRANSITIONS

3.4.2.3. BEHAVIOR ANNEX

3.4.2.4. ERROR ANNEX

4. SYSTEM Heat_Source IS

4.1. DESCRIPTION

4.1.1. PROBLEM

4.1.2. SOLUTION

4.2. TYPE

4.2.1. FEATURE GROUPS

4.2.2. FEATURES

4.2.2.1. heat_control

4.2.2.1.1. Feature Declaration

```
heat_control(Flow : in Heat_Control);
```

4.2.2.1.2. Predeclared Feature Properties

4.2.2.2. heat

4.2.2.2.1. Feature Declaration

```
heat(Flow : out Heat);
```

4.2.2.2.2. Predeclared Feature Properties

4.2.3. PROPERTIES

4.2.3.1. Predeclared Deployment Properties

4.2.3.2. Predeclared Thread Properties

4.2.3.3. Predeclared Timing Properties

4.2.3.4. Predeclared Communication properties

4.2.3.5. Predeclared Memory Properties

4.2.3.6. Predeclared Programming Properties

4.2.3.7. Predeclared Modeling Properties

4.2.3.8. Data Modeling Annex Properties

4.2.3.9. ARINC 653 Annex Properties

4.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;
```

```
  TYPES
```

```
    Heat_Control;
```

```
  CONSTANTS
```

```
    NONE
```

```
  OPERATION_SETS
```

```
    NONE
```

```
  OPERATIONS
```

```
    NONE
```

```
  EXCEPTIONS
```

```
    NONE
```

4.4. IMPLEMENTATION

4.4.1. PROPERTIES

4.4.2. BEHAVIOR

4.4.2.1. MODES

4.4.2.2. TRANSITIONS

4.4.2.3. BEHAVIOR ANNEX

4.4.2.4. ERROR ANNEX

5. SYSTEM Operator_Interface IS

5.1. DESCRIPTION

5.1.1. PROBLEM

5.1.2. SOLUTION

5.2. TYPE

5.2.1. FEATURE GROUPS

5.2.1.1. operator_settings

5.2.1.1.1. Feature Group Contents

```
{operator_settings :  
  {desired_temperature_range :  
    {lower_desired_temperature : val1 status1}  
    {upper_desired_temperature : val2 status2}  
  }  
  {alarm_temperature_range :  
    {lower_alarm_temperature : val3 status3}  
    {upper_alarm_temperature : val4 status4}  
  }  
}
```

5.2.1.1.2. Predeclared Feature Group Properties

5.2.1.2. desired_temperature_range

5.2.1.2.1. Feature Group Contents

```
{desired_temperature_range :  
  {lower_desired_temperature : val1 status1}  
  {upper_desired_temperature : val2 status2}  
}
```

5.2.1.2.2. Predeclared Feature Group Properties

5.2.1.3. lower_desired_temperature

5.2.1.3.1. Feature Group Contents

```
{lower_desired_temperature : val1 status1}
```

5.2.1.3.2. Predeclared Feature Group Properties

5.2.1.4. upper_desired_temperature

5.2.1.4.1. Feature Group Contents

```
{upper_desired_temperature : val2 status2}
```

5.2.1.4.2. Predeclared Feature Group Properties

5.2.1.5. alarm_temperature_range

5.2.1.5.1. Feature Group Contents

```
{alarm_temperature_range :  
  {lower_alarm_temperature : val3 status3}  
  {upper_alarm_temperature : val4 status4}  
}
```

5.2.1.5.2. Predeclared Feature Group Properties

5.2.1.6. lower_alarm_temperature

5.2.1.6.1. Feature Group Contents

```
{lower_alarm_temperature : val3 status3}
```

5.2.1.6.2. Predeclared Feature Group Properties

5.2.1.7. upper_alarm_temperature

5.2.1.7.1. Feature Group Contents

```
{upper_alarm_temperature : val4 status4}
```

5.2.1.7.2. Predeclared Feature Group Properties

5.2.1.8. operator_feedback

5.2.1.8.1. Feature Group Contents

```
{operator_feedback : regulator_status display_temperature monitor_status alarm_control}
```

5.2.1.8.2. Predeclared Feature Group Properties

5.2.2. FEATURES

5.2.2.1. interface_interaction

5.2.2.1.1. Feature Declaration

```
interface_interaction(Flow : in out Interface_Interaction);
```

5.2.2.1.2. Predeclared Feature Properties

5.2.2.2. val1

5.2.2.2.1. Feature Declaration

```
val1(Flow : out Lower_Desired_Temp_Value);
```

5.2.2.2.2. Predeclared Feature Properties

5.2.2.3. status1

5.2.2.3.1. Feature Declaration

```
status1(Flow : out Temp_Status);
```

5.2.2.3.2. Predeclared Feature Properties

5.2.2.4. val2

5.2.2.4.1. Feature Declaration

```
val2(Flow : out Upper_Desired_Temp_Value);
```

5.2.2.4.2. Predeclared Feature Properties

5.2.2.5. status2

5.2.2.5.1. Feature Declaration

```
status2(Flow : out Temp_Status);
```

5.2.2.5.2. Predeclared Feature Properties

5.2.2.6. val3

5.2.2.6.1. Feature Declaration

```
val3(Flow : out Lower_Alarm_Temp_Value);
```

5.2.2.6.2. Predeclared Feature Properties

5.2.2.7. status3

5.2.2.7.1. Feature Declaration

```
status3(Flow : out Temp_Status);
```

5.2.2.7.2. Predeclared Feature Properties

5.2.2.8. val4

5.2.2.8.1. Feature Declaration

```
val4(Flow : out Upper_Alarm_Temp_Value);
```

5.2.2.8.2. Predeclared Feature Properties

5.2.2.9. status4

5.2.2.9.1. Feature Declaration

```
status4(Flow : out Temp_Status);
```

5.2.2.9.2. Predeclared Feature Properties

5.2.2.10. regulator_status

5.2.2.10.1. Feature Declaration

```
regulator_status(Flow : in Regulator_Status);
```

5.2.2.10.2. Predeclared Feature Properties

5.2.2.11. display_temperature

5.2.2.11.1. Feature Declaration

```
display_temperature(Flow : in Display_Temperature);
```

5.2.2.11.2. Predeclared Feature Properties

5.2.2.12. monitor_status

5.2.2.12.1. Feature Declaration

```
monitor_status(Flow : in Monitor_Status);
```

5.2.2.12.2. Predeclared Feature Properties

5.2.2.13. alarm_control

5.2.2.13.1. Feature Declaration

```
alarm_control(Flow : in Alarm);
```

5.2.2.13.2. Predeclared Feature Properties

5.2.3. PROPERTIES

5.2.3.1. Predeclared Deployment Properties

5.2.3.2. Predeclared Thread Properties

5.2.3.3. Predeclared Timing Properties

5.2.3.4. Predeclared Communication properties

5.2.3.5. Predeclared Memory Properties

5.2.3.6. Predeclared Programming Properties

5.2.3.7. Predeclared Modeling Properties

5.2.3.8. Data Modeling Annex Properties

5.2.3.9. ARINC 653 Annex Properties

5.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Interface_Interaction;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE
```

5.4. IMPLEMENTATION

5.4.1. PROPERTIES

5.4.2. BEHAVIOR

5.4.2.1. MODES

5.4.2.2. TRANSITIONS

5.4.2.3. BEHAVIOR ANNEX

5.4.2.4. ERROR ANNEX

6. SYSTEM Air IS

6.1. DESCRIPTION

6.1.1. PROBLEM

6.1.2. SOLUTION

6.2. TYPE

6.2.1. FEATURE GROUPS

6.2.2. FEATURES

6.2.2.1. heat_in

6.2.2.1.1. Feature Declaration

```
heat_in(Flow : in Heat);
```

6.2.2.1.2. Predeclared Feature Properties

6.2.2.2. heat_out

6.2.2.2.1. Feature Declaration

```
heat_out(Flow : out Heat);
```

6.2.2.2.2. Predeclared Feature Properties

6.2.2.3. air_interaction

6.2.2.3.1. Feature Declaration

```
air_interaction(Flow : in out Air_Interaction);
```

6.2.2.3.2. Predeclared Feature Properties

6.2.3. PROPERTIES

6.2.3.1. Predeclared Deployment Properties

6.2.3.2. Predeclared Thread Properties

6.2.3.3. Predeclared Timing Properties

6.2.3.4. Predeclared Communication properties

6.2.3.5. Predeclared Memory Properties

6.2.3.6. Predeclared Programming Properties

6.2.3.7. Predeclared Modeling Properties

6.2.3.8. Data Modeling Annex Properties

6.2.3.9. ARINC 653 Annex Properties

6.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Air_Interaction;
```


CONSTANTS
NONE
OPERATION_SETS
NONE
OPERATIONS
NONE
EXCEPTIONS
NONE
OBJECT Temperature_Sensor ;
TYPES
NONE
CONSTANTS
NONE
OPERATION_SETS
NONE
OPERATIONS
heat ;
EXCEPTIONS
NONE

6.4. IMPLEMENTATION

6.4.1. PROPERTIES

6.4.2. BEHAVIOR

6.4.2.1. MODES

6.4.2.2. TRANSITIONS

6.4.2.3. BEHAVIOR ANNEX

6.4.2.4. ERROR ANNEX

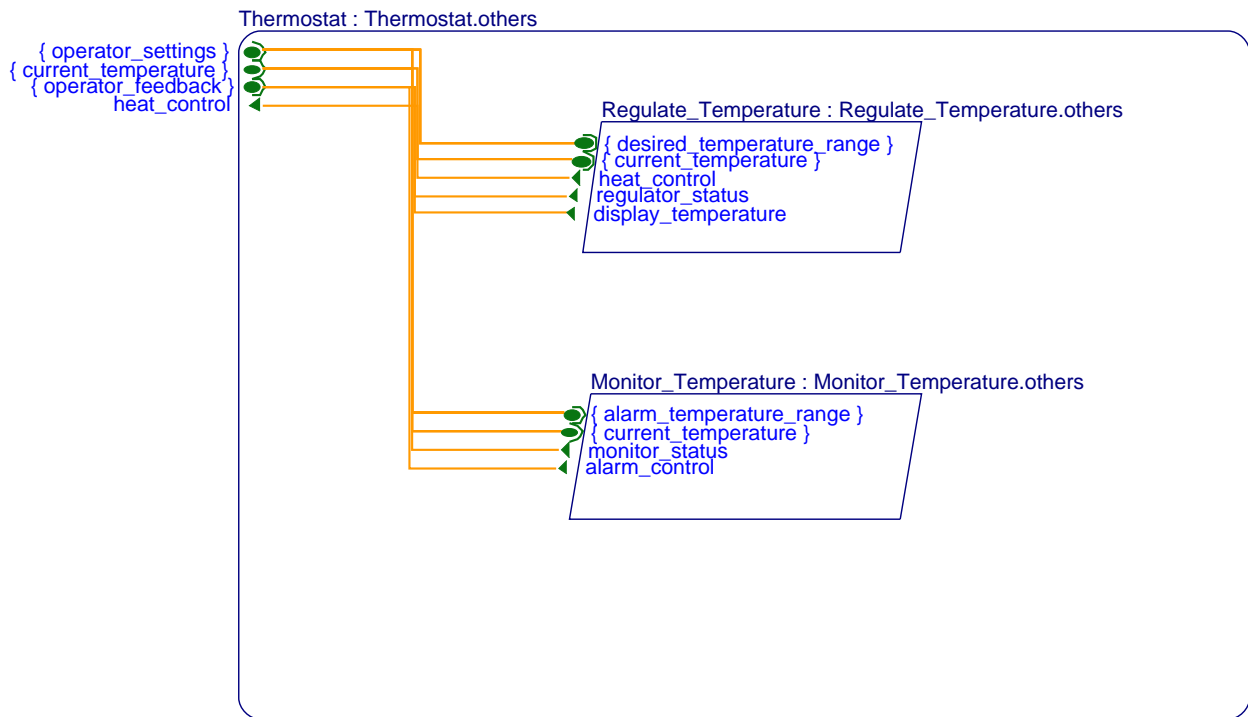
7. SYSTEM Thermostat IS

7.1. DESCRIPTION

7.1.1. PROBLEM

7.1.2. SOLUTION

7.1.2.1. AADL Diagram



7.2. TYPE

7.2.1. FEATURE GROUPS

7.2.1.1. operator_settings

7.2.1.1.1. Feature Group Contents

```
{operator_settings :
  {desired_temperature_range :
    {lower_desired_temperature : val1 status1}
    {upper_desired_temperature : val2 status2}
  }
  {alarm_temperature_range :
    {lower_alarm_temperature : val3 status3}
    {upper_alarm_temperature : val4 status4}
  }
}
```

7.2.1.1.2. Predeclared Feature Group Properties

7.2.1.2. desired_temperature_range

7.2.1.2.1. Feature Group Contents

```
{desired_temperature_range :
  {lower_desired_temperature : val1 status1}
  {upper_desired_temperature : val2 status2}
}
```

7.2.1.2.2. Predeclared Feature Group Properties

7.2.1.3. lower_desired_temperature

7.2.1.3.1. Feature Group Contents

```
{lower_desired_temperature : val1 status1}
```

7.2.1.3.2. Predeclared Feature Group Properties

7.2.1.4. upper_desired_temperature

7.2.1.4.1. Feature Group Contents

```
{upper_desired_temperature : val2 status2}
```

7.2.1.4.2. Predeclared Feature Group Properties

7.2.1.5. alarm_temperature_range

7.2.1.5.1. Feature Group Contents

```
{alarm_temperature_range :  
  {lower_alarm_temperature : val3 status3}  
  {upper_alarm_temperature : val4 status4}  
}
```

7.2.1.5.2. Predeclared Feature Group Properties

7.2.1.6. lower_alarm_temperature

7.2.1.6.1. Feature Group Contents

```
{lower_alarm_temperature : val3 status3}
```

7.2.1.6.2. Predeclared Feature Group Properties

7.2.1.7. upper_alarm_temperature

7.2.1.7.1. Feature Group Contents

```
{upper_alarm_temperature : val4 status4}
```

7.2.1.7.2. Predeclared Feature Group Properties

7.2.1.8. current_temperature

7.2.1.8.1. Feature Group Contents

```
{current_temperature : val status}
```

7.2.1.8.2. Predeclared Feature Group Properties

7.2.1.9. operator_feedback

7.2.1.9.1. Feature Group Contents

```
{operator_feedback : regulator_status display_temperature monitor_status alarm_control}
```

7.2.1.9.2. Predeclared Feature Group Properties

7.2.2. FEATURES

7.2.2.1. val1

7.2.2.1.1. Feature Declaration

```
val1(Flow : in Lower_Desired_Temp_Value);
```

7.2.2.1.2. Predeclared Feature Properties

7.2.2.2. status1

7.2.2.2.1. Feature Declaration

```
status1(Flow : in Temp_Status);
```

7.2.2.2.2. Predeclared Feature Properties

7.2.2.3. val2

7.2.2.3.1. Feature Declaration

```
val2(Flow : in Upper_Desired_Temp_Value);
```

7.2.2.3.2. Predeclared Feature Properties

7.2.2.4. status2

7.2.2.4.1. Feature Declaration

```
status2(Flow : in Temp_Status);
```

7.2.2.4.2. Predeclared Feature Properties

7.2.2.5. val3

7.2.2.5.1. Feature Declaration

```
val3(Flow : in Lower_Alarm_Temp_Value);
```

7.2.2.5.2. Predeclared Feature Properties

7.2.2.6. status3

7.2.2.6.1. Feature Declaration

```
status3(Flow : in Temp_Status);
```

7.2.2.6.2. Predeclared Feature Properties

7.2.2.7. val4

7.2.2.7.1. Feature Declaration

```
val4(Flow : in Upper_Alarm_Temp_Value);
```

7.2.2.7.2. Predeclared Feature Properties

7.2.2.8. status4

7.2.2.8.1. Feature Declaration

```
status4(Flow : in Temp_Status);
```

7.2.2.8.2. Predeclared Feature Properties

7.2.2.9. val

7.2.2.9.1. Feature Declaration

```
val(Flow : in Current_Temp_Value);
```

7.2.2.9.2. Predeclared Feature Properties

7.2.2.10. status

7.2.2.10.1. Feature Declaration

```
status(Flow : in Temp_Status);
```

7.2.2.10.2. Predeclared Feature Properties

7.2.2.11. regulator_status

7.2.2.11.1. Feature Declaration

```
regulator_status(Flow : out Regulator_Status);
```

7.2.2.11.2. Predeclared Feature Properties

7.2.2.12. display_temperature

7.2.2.12.1. Feature Declaration

```
display_temperature(Flow : out Display_Temperature);
```

7.2.2.12.2. Predeclared Feature Properties

7.2.2.13. monitor_status

7.2.2.13.1. Feature Declaration

```
monitor_status(Flow : out Monitor_Status);
```

7.2.2.13.2. Predeclared Feature Properties

7.2.2.14. alarm_control

7.2.2.14.1. Feature Declaration

```
alarm_control(Flow : out Alarm);
```

7.2.2.14.2. Predeclared Feature Properties

7.2.2.15. heat_control

7.2.2.15.1. Feature Declaration

```
heat_control(Flow : out Heat_Control);
```

7.2.2.15.2. Predeclared Feature Properties

7.2.3. PROPERTIES

7.2.3.1. Predeclared Deployment Properties

7.2.3.2. Predeclared Thread Properties

7.2.3.3. Predeclared Timing Properties

7.2.3.4. Predeclared Communication properties

7.2.3.5. Predeclared Memory Properties

7.2.3.6. Predeclared Programming Properties

7.2.3.7. Predeclared Modeling Properties

7.2.3.8. Data Modeling Annex Properties

7.2.3.9. ARINC 653 Annex Properties

7.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;
```

```
  TYPES
```

```
    Lower_Desired_Temp_Value; Temp_Status; Upper_Desired_Temp_Value; Lower_Alarm_Temp_V  
Upper_Alarm_Temp_Value; Current_Temp_Value; Regulator_Status; Display_Temperature; Monitor  
Alarm; Heat_Control;
```

```
  CONSTANTS
```

```
    NONE
```

```
  OPERATION_SETS
```

```

    NONE
OPERATIONS
    NONE
EXCEPTIONS
    NONE
OBJECT Monitor_DataTypes;
TYPES
    Monitor_Mode; Lower_Alarm_Temp; Upper_Alarm_Temp;
CONSTANTS
    NONE
OPERATION_SETS
    NONE
OPERATIONS
    NONE
EXCEPTIONS
    NONE
OBJECT Regulator_DataTypes;
TYPES
    Lower_Desired_Temp; Upper_Desired_Temp; Regulator_Mode;
CONSTANTS
    NONE
OPERATION_SETS
    NONE
OPERATIONS
    NONE
EXCEPTIONS
    NONE

```

7.4. IMPLEMENTATION

7.4.1. SUBCOMPONENTS

```

Regulate_Temperature;
Monitor_Temperature;

```

7.4.2. CONNECTIONS

7.4.2.1. operator_settings

7.4.2.2. desired_temperature_range

7.4.2.3. lower_desired_temperature

7.4.2.3.1. Is Connected To

```

Regulate_Temperature.lower_desired_temperature

```

7.4.2.4. upper_desired_temperature

7.4.2.4.1. Is Connected To

```

Regulate_Temperature.upper_desired_temperature

```

7.4.2.5. alarm_temperature_range

7.4.2.6. lower_alarm_temperature

7.4.2.6.1. Is Connected To

```

Monitor_Temperature.lower_alarm_temperature

```

7.4.2.7. upper_alarm_temperature

7.4.2.7.1. Is Connected To

Monitor_Temperature.upper_alarm_temperature

7.4.2.8. current_temperature

7.4.2.8.1. Is Connected To

Monitor_Temperature.current_temperature

7.4.2.9. operator_feedback

7.4.2.10. val1

7.4.2.10.1. Is Connected To

Regulate_Temperature.val1

7.4.2.11. status1

7.4.2.11.1. Is Connected To

Regulate_Temperature.status1

7.4.2.12. val2

7.4.2.12.1. Is Connected To

Regulate_Temperature.val2

7.4.2.13. status2

7.4.2.13.1. Is Connected To

Regulate_Temperature.status2

7.4.2.14. val3

7.4.2.14.1. Is Connected To

Monitor_Temperature.val3

7.4.2.15. status3

7.4.2.15.1. Is Connected To

Monitor_Temperature.status3

7.4.2.16. val4

7.4.2.16.1. Is Connected To

Monitor_Temperature.val4

7.4.2.17. status4

7.4.2.17.1. Is Connected To

Monitor_Temperature.status4

7.4.2.18. val

7.4.2.18.1. Is Connected To

Regulate_Temperature.val

7.4.2.19. status

7.4.2.19.1. Is Connected To

Regulate_Temperature.status

7.4.2.20. regulator_status

7.4.2.20.1. Is Connected To

Regulate_Temperature.regulator_status

7.4.2.21. display_temperature

7.4.2.21.1. Is Connected To

Regulate_Temperature.display_temperature

7.4.2.22. monitor_status

7.4.2.22.1. Is Connected To

Monitor_Temperature.monitor_status

7.4.2.23. alarm_control

7.4.2.23.1. Is Connected To

Monitor_Temperature.alarm_control

7.4.2.24. heat_control

7.4.2.24.1. Is Connected To

Regulate_Temperature.heat_control

7.4.3. PROPERTIES

7.4.4. BEHAVIOR

7.4.4.1. MODES

7.4.4.2. TRANSITIONS

7.4.4.3. BEHAVIOR ANNEX

7.4.4.4. ERROR ANNEX

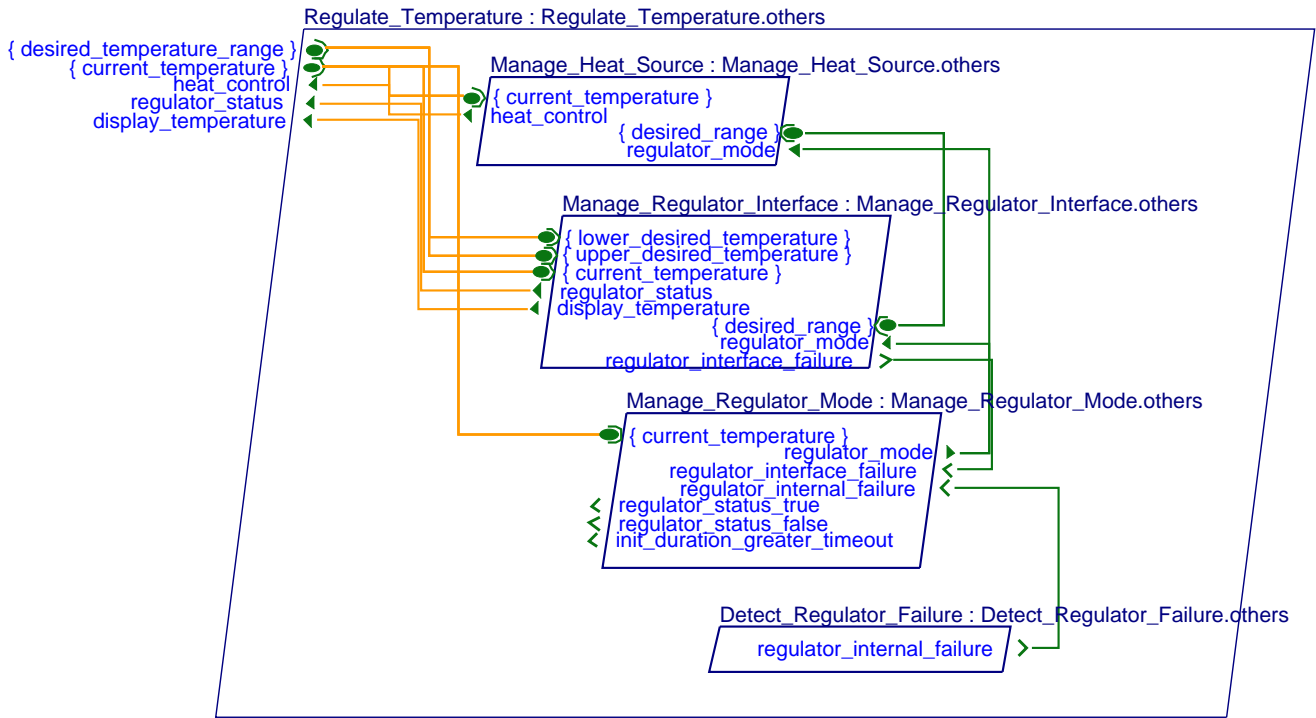
8. PROCESS Regulate_Temperature IS

8.1. DESCRIPTION

8.1.1. PROBLEM

8.1.2. SOLUTION

8.1.2.1. AADL Diagram



8.2. TYPE

8.2.1. FEATURE GROUPS

8.2.1.1. desired_temperature_range

8.2.1.1.1. Feature Group Contents

```
{desired_temperature_range :
  {lower_desired_temperature : val1 status1}
  {upper_desired_temperature : val2 status2}
}
```

8.2.1.1.2. Predeclared Feature Group Properties

8.2.1.2. lower_desired_temperature

8.2.1.2.1. Feature Group Contents

```
{lower_desired_temperature : val1 status1}
```

8.2.1.2.2. Predeclared Feature Group Properties

8.2.1.3. upper_desired_temperature

8.2.1.3.1. Feature Group Contents

```
{upper_desired_temperature : val2 status2}
```

8.2.1.3.2. Predeclared Feature Group Properties

8.2.1.4. current_temperature

8.2.1.4.1. Feature Group Contents

```
{current_temperature : val status}
```

8.2.1.4.2. Predeclared Feature Group Properties

8.2.2. FEATURES

8.2.2.1. val1

8.2.2.1.1. Feature Declaration

```
val1(Flow : in Lower_Desired_Temp_Value);
```

8.2.2.1.2. Predeclared Feature Properties

8.2.2.2. status1

8.2.2.2.1. Feature Declaration

```
status1(Flow : in Temp_Status);
```

8.2.2.2.2. Predeclared Feature Properties

8.2.2.3. val2

8.2.2.3.1. Feature Declaration

```
val2(Flow : in Upper_Desired_Temp_Value);
```

8.2.2.3.2. Predeclared Feature Properties

8.2.2.4. status2

8.2.2.4.1. Feature Declaration

```
status2(Flow : in Temp_Status);
```

8.2.2.4.2. Predeclared Feature Properties

8.2.2.5. val

8.2.2.5.1. Feature Declaration

```
val(Flow : in Current_Temp_Value);
```

8.2.2.5.2. Predeclared Feature Properties

8.2.2.6. status

8.2.2.6.1. Feature Declaration

```
status(Flow : in Temp_Status);
```

8.2.2.6.2. Predeclared Feature Properties

8.2.2.7. heat_control

8.2.2.7.1. Feature Declaration

```
heat_control(Flow : out Heat_Control);
```

8.2.2.7.2. Predeclared Feature Properties

8.2.2.8. regulator_status

8.2.2.8.1. Feature Declaration

```
regulator_status(Flow : out Regulator_Status);
```

8.2.2.8.2. Predeclared Feature Properties

8.2.2.9. display_temperature

8.2.2.9.1. Feature Declaration

```
display_temperature(Flow : out Display_Temperature);
```

8.2.2.9.2. Predeclared Feature Properties

8.2.2.10. thread

8.2.2.10.1. Feature Declaration

thread;

8.2.2.10.2. Predeclared Feature Properties

8.2.3. PROPERTIES

8.2.3.1. Predeclared Deployment Properties

8.2.3.2. Predeclared Thread Properties

8.2.3.3. Predeclared Timing Properties

8.2.3.4. Predeclared Communication properties

8.2.3.5. Predeclared Memory Properties

8.2.3.6. Predeclared Programming Properties

8.2.3.7. Predeclared Modeling Properties

8.2.3.8. Data Modeling Annex Properties

8.2.3.9. ARINC 653 Annex Properties

8.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;
```

```
  TYPES
```

```
    Lower_Desired_Temp_Value; Temp_Status; Upper_Desired_Temp_Value; Current_Temp_Value
```

```
Regulator_Status; Display_Temperature; Heat_Control;
```

```
  CONSTANTS
```

```
    NONE
```

```
  OPERATION_SETS
```

```
    NONE
```

```
  OPERATIONS
```

```
    NONE
```

```
  EXCEPTIONS
```

```
    NONE
```

```
OBJECT Regulator_DataTypes;
```

```
  TYPES
```

```
    Lower_Desired_Temp; Upper_Desired_Temp; Regulator_Mode;
```

```
  CONSTANTS
```

```
    NONE
```

```
  OPERATION_SETS
```

```
    NONE
```

```
  OPERATIONS
```

```
    NONE
```

```
  EXCEPTIONS
```

```
    NONE
```

8.4. IMPLEMENTATION

8.4.1. SUBCOMPONENTS

Manage_Heat_Source;
Manage_Regulator_Interface;
Manage_Regulator_Mode;
Detect_Regulator_Failure;

8.4.2. CONNECTIONS

8.4.2.1. desired_temperature_range

8.4.2.2. lower_desired_temperature

8.4.2.2.1. Is Connected To

Manage_Regulator_Interface.lower_desired_temperature

8.4.2.3. upper_desired_temperature

8.4.2.3.1. Is Connected To

Manage_Regulator_Interface.upper_desired_temperature

8.4.2.4. current_temperature

8.4.2.4.1. Is Connected To

Manage_Heat_Source.current_temperature

8.4.2.5. val1

8.4.2.5.1. Is Connected To

Manage_Regulator_Interface.val1

8.4.2.6. status1

8.4.2.6.1. Is Connected To

Manage_Regulator_Interface.status1

8.4.2.7. val2

8.4.2.7.1. Is Connected To

Manage_Regulator_Interface.val2

8.4.2.8. status2

8.4.2.8.1. Is Connected To

Manage_Regulator_Interface.status2

8.4.2.9. val

8.4.2.9.1. Is Connected To

Manage_Heat_Source.val

8.4.2.10. status

8.4.2.10.1. Is Connected To

Manage_Heat_Source.status

8.4.2.11. heat_control

8.4.2.11.1. Is Connected To

Manage_Heat_Source.heat_control

8.4.2.12. regulator_status

8.4.2.12.1. Is Connected To

Manage_Regulator_Interface.regulator_status

8.4.2.13. display_temperature

8.4.2.13.1. Is Connected To

Manage_Regulator_Interface.display_temperature

8.4.3. PROPERTIES

8.4.4. BEHAVIOR

8.4.4.1. MODES

8.4.4.2. TRANSITIONS

8.4.4.3. BEHAVIOR ANNEX

8.4.4.4. ERROR ANNEX

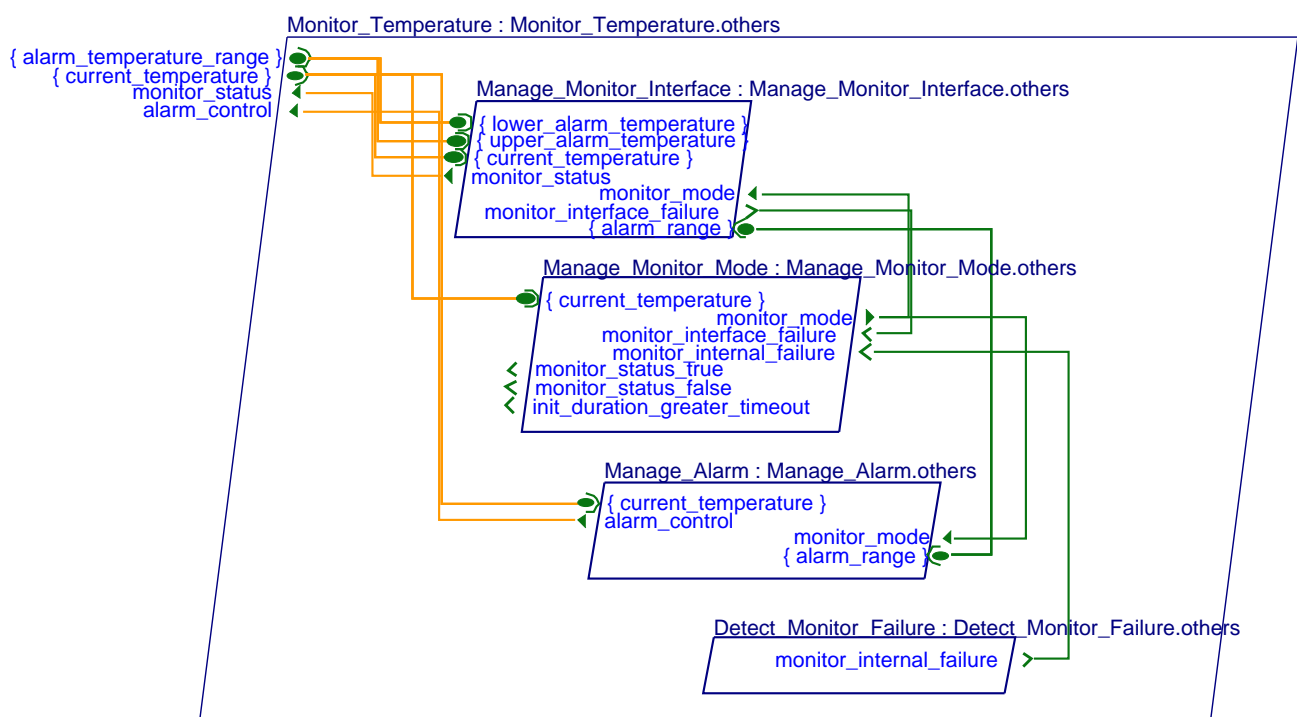
9. PROCESS Monitor_Temperature IS

9.1. DESCRIPTION

9.1.1. PROBLEM

9.1.2. SOLUTION

9.1.2.1. AADL Diagram



9.2. TYPE

9.2.1. FEATURE GROUPS

9.2.1.1. alarm_temperature_range

9.2.1.1.1. Feature Group Contents

```
{alarm_temperature_range :  
  {lower_alarm_temperature : val3 status3}  
  {upper_alarm_temperature : val4 status4}  
}
```

9.2.1.1.2. Predeclared Feature Group Properties

9.2.1.2. lower_alarm_temperature

9.2.1.2.1. Feature Group Contents

```
{lower_alarm_temperature : val3 status3}
```

9.2.1.2.2. Predeclared Feature Group Properties

9.2.1.3. upper_alarm_temperature

9.2.1.3.1. Feature Group Contents

```
{upper_alarm_temperature : val4 status4}
```

9.2.1.3.2. Predeclared Feature Group Properties

9.2.1.4. current_temperature

9.2.1.4.1. Feature Group Contents

```
{current_temperature : val status}
```

9.2.1.4.2. Predeclared Feature Group Properties

9.2.2. FEATURES

9.2.2.1. val3

9.2.2.1.1. Feature Declaration

```
val3(Flow : in Lower_Alarm_Temp_Value);
```

9.2.2.1.2. Predeclared Feature Properties

9.2.2.2. status3

9.2.2.2.1. Feature Declaration

```
status3(Flow : in Temp_Status);
```

9.2.2.2.2. Predeclared Feature Properties

9.2.2.3. val4

9.2.2.3.1. Feature Declaration

```
val4(Flow : in Upper_Alarm_Temp_Value);
```

9.2.2.3.2. Predeclared Feature Properties

9.2.2.4. status4

9.2.2.4.1. Feature Declaration

status4(Flow : in Temp_Status);

9.2.2.4.2. Predeclared Feature Properties

9.2.2.5. val

9.2.2.5.1. Feature Declaration

val(Flow : in Current_Temp_Value);

9.2.2.5.2. Predeclared Feature Properties

9.2.2.6. status

9.2.2.6.1. Feature Declaration

status(Flow : in Temp_Status);

9.2.2.6.2. Predeclared Feature Properties

9.2.2.7. monitor_status

9.2.2.7.1. Feature Declaration

monitor_status(Flow : out Monitor_Status);

9.2.2.7.2. Predeclared Feature Properties

9.2.2.8. alarm_control

9.2.2.8.1. Feature Declaration

alarm_control(Flow : out Alarm);

9.2.2.8.2. Predeclared Feature Properties

9.2.2.9. thread

9.2.2.9.1. Feature Declaration

thread;

9.2.2.9.2. Predeclared Feature Properties

9.2.3. PROPERTIES

9.2.3.1. Predeclared Deployment Properties

9.2.3.2. Predeclared Thread Properties

9.2.3.3. Predeclared Timing Properties

9.2.3.4. Predeclared Communication properties

9.2.3.5. Predeclared Memory Properties

9.2.3.6. Predeclared Programming Properties

9.2.3.7. Predeclared Modeling Properties

9.2.3.8. Data Modeling Annex Properties

9.2.3.9. ARINC 653 Annex Properties

9.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Lower_Alarm_Temp_Value; Temp_Status; Upper_Alarm_Temp_Value; Current_Temp_Value;  
  Monitor_Status; Alarm;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE  
OBJECT Monitor_DataTypes;  
  TYPES  
    Monitor_Mode; Lower_Alarm_Temp; Upper_Alarm_Temp;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE
```

9.4. IMPLEMENTATION

9.4.1. SUBCOMPONENTS

```
Manage_Monitor_Interface;  
Manage_Monitor_Mode;  
Manage_Alarm;  
Detect_Monitor_Failure;
```

9.4.2. CONNECTIONS

9.4.2.1. alarm_temperature_range

9.4.2.2. lower_alarm_temperature

9.4.2.2.1. Is Connected To

```
Manage_Monitor_Interface.lower_alarm_temperature
```

9.4.2.3. upper_alarm_temperature

9.4.2.3.1. Is Connected To

```
Manage_Monitor_Interface.upper_alarm_temperature
```

9.4.2.4. current_temperature

9.4.2.4.1. Is Connected To

```
Manage_Monitor_Interface.current_temperature
```

9.4.2.5. val3

9.4.2.5.1. Is Connected To

```
Manage_Monitor_Interface.val3
```


9.4.2.6. status3

9.4.2.6.1. Is Connected To

Manage_Monitor_Interface.status3

9.4.2.7. val4

9.4.2.7.1. Is Connected To

Manage_Monitor_Interface.val4

9.4.2.8. status4

9.4.2.8.1. Is Connected To

Manage_Monitor_Interface.status4

9.4.2.9. val

9.4.2.9.1. Is Connected To

Manage_Monitor_Interface.val

9.4.2.10. status

9.4.2.10.1. Is Connected To

Manage_Monitor_Interface.status

9.4.2.11. monitor_status

9.4.2.11.1. Is Connected To

Manage_Monitor_Interface.monitor_status

9.4.2.12. alarm_control

9.4.2.12.1. Is Connected To

Manage_Alarm.alarm_control

9.4.3. PROPERTIES

9.4.4. BEHAVIOR

9.4.4.1. MODES

9.4.4.2. TRANSITIONS

9.4.4.3. BEHAVIOR ANNEX

9.4.4.4. ERROR ANNEX

10. SYSTEM Nurse IS

10.1. DESCRIPTION

10.1.1. PROBLEM

10.1.2. SOLUTION

10.2. TYPE

10.2.1. FEATURE GROUPS

10.2.2. FEATURES

10.2.2.1. interface_interaction

10.2.2.1.1. Feature Declaration

```
interface_interaction(Flow : in out Interface_Interaction);
```

10.2.2.1.2. Predeclared Feature Properties

10.2.3. PROPERTIES

10.2.3.1. Predeclared Deployment Properties

10.2.3.2. Predeclared Thread Properties

10.2.3.3. Predeclared Timing Properties

10.2.3.4. Predeclared Communication properties

10.2.3.5. Predeclared Memory Properties

10.2.3.6. Predeclared Programming Properties

10.2.3.7. Predeclared Modeling Properties

10.2.3.8. Data Modeling Annex Properties

10.2.3.9. ARINC 653 Annex Properties

10.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Interface_Interaction;  
  CONSTANTS  
    NONE  
  OPERATION_SETS  
    NONE  
  OPERATIONS  
    NONE  
  EXCEPTIONS  
    NONE
```

10.4. IMPLEMENTATION

10.4.1. PROPERTIES

10.4.2. BEHAVIOR

10.4.2.1. MODES

10.4.2.2. TRANSITIONS

10.4.2.3. BEHAVIOR ANNEX

10.4.2.4. ERROR ANNEX

11. SYSTEM Infant IS

11.1. DESCRIPTION

11.1.1. PROBLEM

11.1.2. SOLUTION

11.2. TYPE

11.2.1. FEATURE GROUPS

11.2.2. FEATURES

11.2.2.1. air_interaction

11.2.2.1.1. Feature Declaration

```
air_interaction(Flow : in out Air_Interaction);
```

11.2.2.1.2. Predeclared Feature Properties

11.2.3. PROPERTIES

11.2.3.1. Predeclared Deployment Properties

11.2.3.2. Predeclared Thread Properties

11.2.3.3. Predeclared Timing Properties

11.2.3.4. Predeclared Communication properties

11.2.3.5. Predeclared Memory Properties

11.2.3.6. Predeclared Programming Properties

11.2.3.7. Predeclared Modeling Properties

11.2.3.8. Data Modeling Annex Properties

11.2.3.9. ARINC 653 Annex Properties

11.3. REQUIRED INTERFACE

```
OBJECT Isolette_DataTypes;  
  TYPES  
    Air_Interaction;  
  CONSTANTS  
    NONE
```

OPERATION_SETS
NONE
OPERATIONS
NONE
EXCEPTIONS
NONE

11.4. IMPLEMENTATION

11.4.1. PROPERTIES

11.4.2. BEHAVIOR

11.4.2.1. MODES

11.4.2.2. TRANSITIONS

11.4.2.3. BEHAVIOR ANNEX

11.4.2.4. ERROR ANNEX