modelica-json parser

Install on Windows:

- Create MODELICAPATH environment variable and set it as path to Modelica Buildings Library
- Install JRE and JDK, 64-bit
- Install Node.js.
- Install dependencies and compile Java files, run “InstallOnWindows.bat”
- Test installation, from the **`\modelica-json`** directory, run the parser on Command Prompt:

```
node app.js -f test\FromModelica\Modulation.mo
```

Install on Ubuntu:

- Set MODELICAPATH environment: `export MODELICAPATH=${MODELICAPATH}:/usr/local/Modelica/Library/`
- Install Java and node: `sudo apt-get install nodejs npm default-jdk`
- Install dependencies: `make install`
- Compile the Java files: `make compile`
- Run the test cases: `npm test`

Detailed documentation: https://lbl-srg.github.io/modelica-json/

modelica-json parser

Use the parser: `node app.js -f <path of the file to parse>`

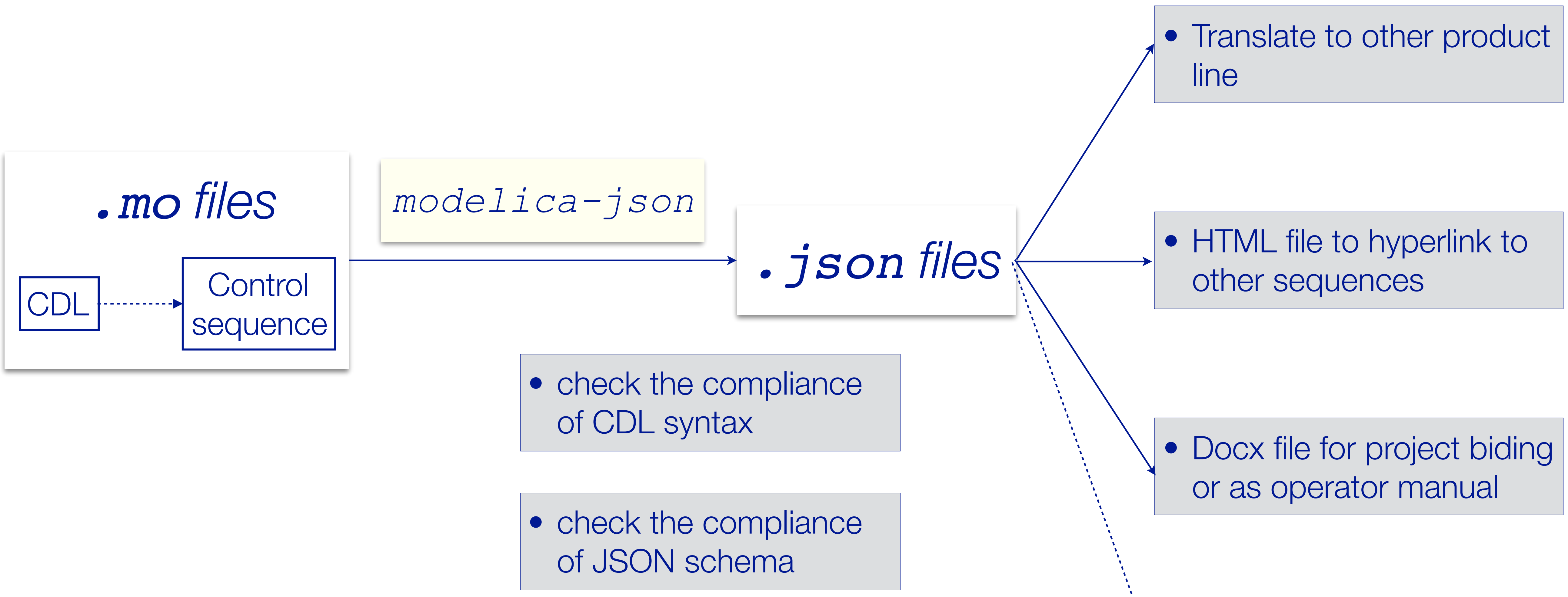
- `-file / -f`: path of the file or package to be parsed
- `-output / -o`: output format, ‘`raw-json`’, ‘`json`’ (default), ‘`html`’, ‘`docx`’
- `-mode / -m`: translation mode, ‘`modelica`’, ‘`cdl`’ (default)
- `-log / -l`: logging level, ‘`error`’, ‘`warn`’, ‘`info`’ (default), ‘`verbose`’, ‘`debug`’
- `-directory / -d`: output directory, the default is the current directory

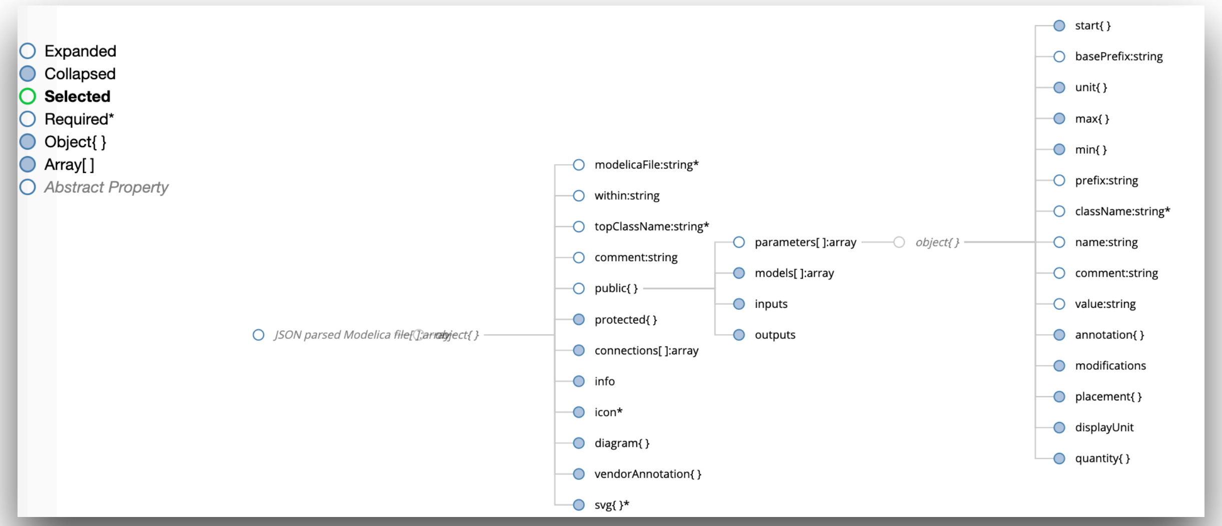
Validate JSON schemas: `node validate.js -f <path of the json file>`

Two schemas are available: `Schema-CDL.json`, `Schema-modelica.json`

Detailed documentation: https://lbl-srg.github.io/modelica-json/

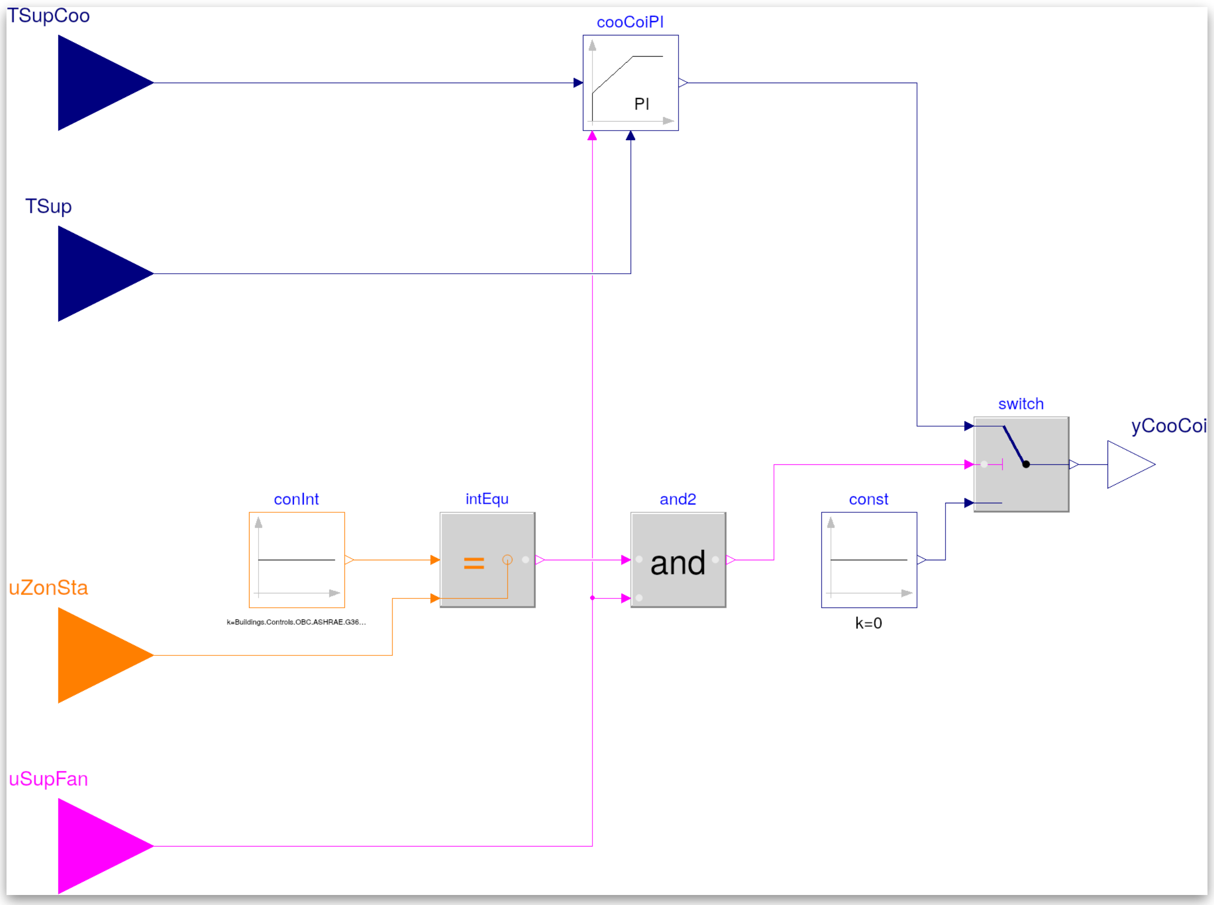
JSON file as intermedia format for documentations and further developments


.mo files
CDL
Control sequence
modelica-json
.json files
• Translate to other product line
• HTML file to hyperlink to other sequences
• Docx file for project biding or as operator manual
• Part of sequence selection tool
• check the compliance of CDL syntax
• check the compliance of JSON schema



Translate sequence with modelica-json: example

AHUs.SingleZone.VAV.CoolingCoil



"Output the cooling coil control signal (`yCooCoi`) if the fan is on (`uSupFan = true`) and the zone status (`uZonSta = cooling`) is in cooling mode. Otherwise, the control signal is set to `0`."

https://github.com/lbl-srg/modelica-json

```
within Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV;
model CoolingCoil "Controller for cooling coil valve"
  parameter Buildings.Controls.OBC.CDL.Types.SimpleController controllerTypeCooCoi=
    Buildings.Controls.OBC.CDL.Types.SimpleController.PI
    "Type of controller"
    annotation(Dialog(group="Cooling coil loop signal”));
……
  CDL.Continuous.LimPID cooCoiPI(
    reverseAction=true,
    reset=Buildings.Controls.OBC.CDL.Types.Reset.Parameter,
   …) "Cooling coil control signal"
    annotation (Placement(transformation(extent={{-10,70},{10,90}})));
……
 CDL.Interfaces.IntegerInput uZonSta "Zone state"
……
  CDL.Interfaces.RealOutput yCooCoi "Cooling coil control signal"
……
equation
  connect(const.y, switch.u3) annotation (Line(points={{62,-20},{66,-20},{66,-8},
          {70,-8}}, color={0,0,127}));
  connect(switch.u1, cooCoiPI.y)
    annotation (Line(points={{70,8},{60,8},{60,80},{12,80}},color={0,0,127}));
……
 annotation (defaultComponentName="cooCoi",
        Icon(coordinateSystem(preserveAspectRatio=false), graphics={}),
        Diagram(coordinateSystem(preserveAspectRatio=false)),
Documentation(info="<html>
<p>
This block outputs the cooling coil control signal if the fan is on and the zone
status
</p>
</html>",revisions="<html>
<ul><li>
August 1, 2019, by David Blum:<br/>
First implementation.
</li></ul>
</html>"));
end CoolingCoil;
```

From modelica to raw-json

```
node app.js -f models/CoolingCoil.mo -o raw-json
```

```
within Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV;
model CoolingCoil "Controller for cooling coil valve"
  parameter Buildings.Controls.OBC.CDL.Types.SimpleController controllerTypeCooCoi=
    Buildings.Controls.OBC.CDL.Types.SimpleController.PI
    "Type of controller"
    annotation(Dialog(group="Cooling coil loop signal”));
……
  CDL.Continuous.LimPID cooCoiPI(
    reverseAction=true,
    reset=Buildings.Controls.OBC.CDL.Types.Reset.Parameter,
   …) "Cooling coil control signal"
    annotation (Placement(transformation(extent={{-10,70},{10,90}})));
……
 CDL.Interfaces.IntegerInput uZonSta "Zone state"
……
  CDL.Interfaces.RealOutput yCooCoi "Cooling coil control signal"
……
equation
  connect(const.y, switch.u3) annotation (Line(points={{62,-20},{66,-20},{66,-8},
          {70,-8}}, color={0,0,127}));
  connect(switch.u1, cooCoiPI.y)
    annotation (Line(points={{70,8},{60,8},{60,80},{12,80}},color={0,0,127}));
……
 annotation (defaultComponentName="cooCoi",
       Icon(coordinateSystem(preserveAspectRatio=false), graphics={}),
       Diagram(coordinateSystem(preserveAspectRatio=false)),
Documentation(info="<html>
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</p>
</html>",revisions="<html>
<ul><li>
August 1, 2019, by David Blum:<br/>
First implementation.
</li></ul>
</html>"));
end CoolingCoil;
```

```
[
  {
    "within": [
      "Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV"
    ],
    "class_definition": [
      {
        "class_prefixes": "model",
        "class_specifier": {
          "long_class_specifier": {
            "name": "CoolingCoil",
            "comment": "\"Controller for cooling coil valve\"",
            "composition": {
              "element_list": {
                "element": [
                  {
                    "component_clause": {
                      "type_prefix": "parameter",
                      "type_specifier": "Buildings.Controls.OBC.CDL.Types.SimpleController",
                      "component_list": {
                        "component_declaration": [
                          {
                            "declaration": {
                              "name": "controllerTypeCooCoi",
                              "value": "Buildings.Controls.OBC.CDL.Types.SimpleController.PI"
                            },
                            "comment": {
                              "string_comment": "\"Type of controller\"",
                              "annotation": {
                                "dialog": [
                                  {
                                    "name": "group",
                                    "value": "\"Cooling coil loop signal\""
                                  }
                                ]
                              }
                            }
                          }
```

From modelica to json

```
node app.js -f models/CoolingCoil.mo -o json
```

```
within Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV;
model CoolingCoil "Controller for cooling coil valve"
  parameter Buildings.Controls.OBC.CDL.Types.SimpleController controllerTypeCooCoi=
    Buildings.Controls.OBC.CDL.Types.SimpleController.PI
    "Type of controller"
    annotation(Dialog(group="Cooling coil loop signal"));
……
  CDL.Continuous.LimPID cooCoiPI(
    reverseAction=true,
    reset=Buildings.Controls.OBC.CDL.Types.Reset.Parameter,
   …) "Cooling coil control signal"
    annotation (Placement(transformation(extent={{-10,70},{10,90}})));
……
 CDL.Interfaces.IntegerInput uZonSta "Zone state"
……
  CDL.Interfaces.RealOutput yCooCoi "Cooling coil control signal"
……
equation
  connect(const.y, switch.u3) annotation (Line(points={{62,-20},{66,-20},{66,-8},
          {70,-8}}, color={0,0,127}));
  connect(switch.u1, cooCoiPI.y)
    annotation (Line(points={{70,8},{60,8},{60,80},{12,80}},color={0,0,127}));
……
 annotation (defaultComponentName="cooCoi",
       Icon(coordinateSystem(preserveAspectRatio=false), graphics={}),
       Diagram(coordinateSystem(preserveAspectRatio=false)),
Documentation(info="<html>
<p>
This block outputs the cooling coil control signal if the fan is on and the zone
status
</p>
</html>",revisions="<html>
<ul><li>
August 1, 2019, by David Blum:<br/>
First implementation.
</li></ul>
</html>"));
end CoolingCoil;
```

```
[
 {
   "modelicaFile": "models/CoolingCoil.mo",
   "within": "Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV",
   "topClassName": "Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV.CoolingCoil",
   "comment": "Controller for cooling coil valve",
   "public": {
     "parameters": [
       {
         "className": "Buildings.Controls.OBC.CDL.Types.SimpleController",
         "type": "Buildings.Controls.OBC.CDL.Types.SimpleController",
         "name": "controllerTypeCooCoi",
         "value": "Buildings.Controls.OBC.CDL.Types.SimpleController.PI",
         "comment": "Type of controller",
         "unit": {
           "value": "\"1\""
         },
         "displayUnit": {
           "value": "\"1\""
         },
         "annotation": {
           "dialog": {
             "group": "Cooling coil loop signal",
             "tab": "General"
           }
         }
       },
       ………
```

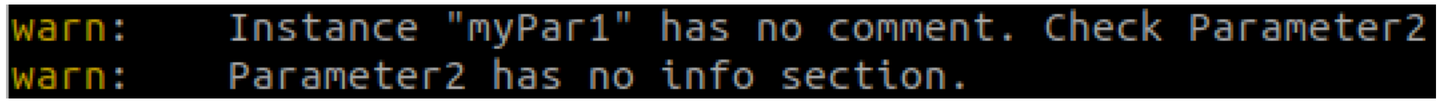
From modelica to json

This process will:

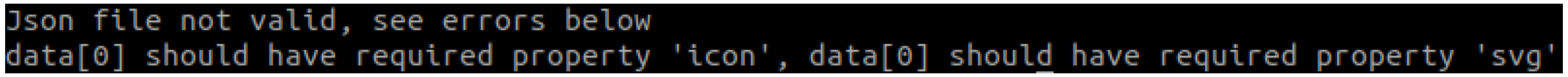
- Simplify raw-json structure
- If there is composite block, parse recursively until only primitive CDL blocks
- Validate if the Modelica code has missing information.
- Validate the JSON representation against the CDL schema.

```
node app.js -f models/Parameter2.mo -o json -m cdl
```

```
block Parameter2 "Some class comment"

  parameter Real myPar1 = 1;
  parameter Real myParNoValue "Some comment";
  parameter Real myParMin(min=0) "Some comment";
  parameter Real myParMax(max=0) "Some comment";
  parameter Real myParUnit(unit="K") "Some comment";

  parameter Real myParInGroup "Some comment"
     annotation(Dialog(group="Gains"));
  parameter Real myParInTab "Some comment"
     annotation(Dialog(tab="Initialization tab"));

  parameter Real myParInTabInGroup1 "Some comment 1"
     annotation(Dialog(tab="Initialization tab", group="Initial state"));
  parameter Real myParInTabInGroup2 "Some comment 2"
     annotation(Dialog(tab="Initialization tab", group="Initial state"));
end Parameter2;
```



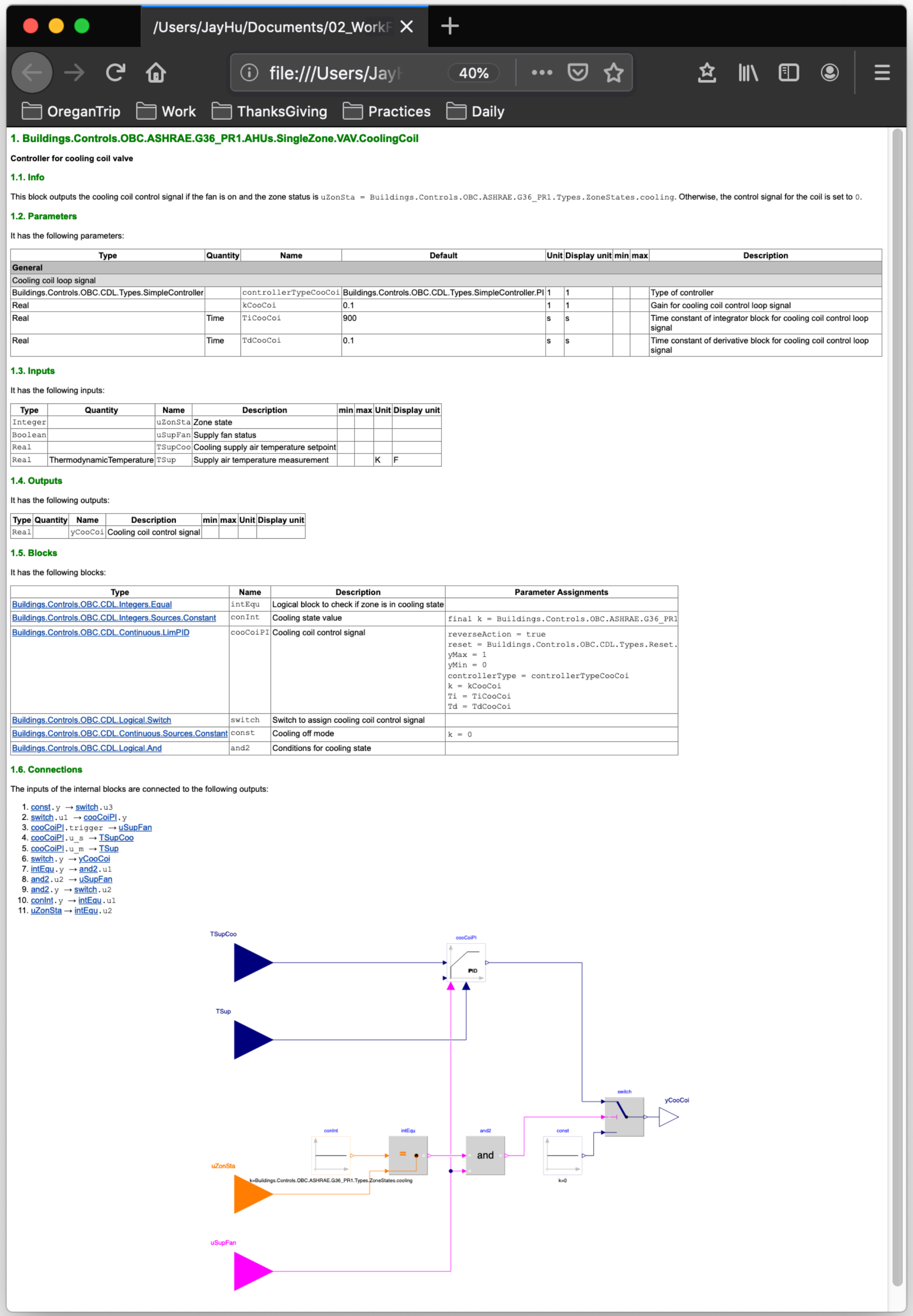
```
warn:     Instance "myPar1" has no comment. Check Parameter2
warn:     Parameter2 has no info section.
```



```
Json file not valid, see errors below
data[0] should have required property 'icon', data[0] should have required property 'svg'
```

Need your contributions:

Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV.CoolingCoil



1. Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV.CoolingCoil

Controller for cooling coil valve

1.1. Info

This block outputs the cooling coil control signal if the fan is on and the zone status is `uZonSta = Buildings.Controls.OBC.ASHRAE.G36_PR1.Types.ZoneStates.cooling`. Otherwise, the control signal for the coil is set to `0`.

1.2. Parameters

It has the following parameters:

Type	Quantity	Name	Default	Unit	Display unit	min	max	Description
General								
Cooling coil loop signal								
Buildings.Controls.OBC.CDL.Types.SimpleController		`controllerTypeCooCoi`	Buildings.Controls.OBC.CDL.Types.SimpleController.PI	1	1			Type of controller
Real		`kCooCoi`	0.1	1	1			Gain for cooling coil control loop signal
Real	Time	`TiCooCoi`	900	s	s			Time constant of integrator block for cooling coil control loop signal
Real	Time	`TdCooCoi`	0.1	s	s			Time constant of derivative block for cooling coil control loop signal

1.3. Inputs

It has the following inputs:

Type	Quantity	Name	Description	min	max	Unit	Display unit
`Integer`		`uZonSta`	Zone state				
`Boolean`		`uSupFan`	Supply fan status				
`Real`		`TSupCoo`	Cooling supply air temperature setpoint				
`Real`	ThermodynamicTemperature	`TSup`	Supply air temperature measurement			K	F

1.4. Outputs

It has the following outputs:

Type	Quantity	Name	Description	min	max	Unit	Display unit
`Real`		`yCooCoi`	Cooling coil control signal				

1.5. Blocks

It has the following blocks:

Type	Name	Description	Parameter Assignments
Buildings.Controls.OBC.CDL.Integers.Equal	`intEqu`	Logical block to check if zone is in cooling state	
Buildings.Controls.OBC.CDL.Integers.Sources.Constant	`conInt`	Cooling state value	`final k = Buildings.Controls.OBC.ASHRAE.G36_PR1`

Buildings.Controls.OBC.CDL.Continuous.LimPID	`cooCoiPI`	Cooling coil control signal	`reverseAction = true`
			`reset = Buildings.Controls.OBC.CDL.Types.Reset.`
			`yMax = 1`
			`yMin = 0`
			`controllerType = controllerTypeCooCoi`
			`k = kCooCoi`
			`Ti = TiCooCoi`
			`Td = TdCooCoi`

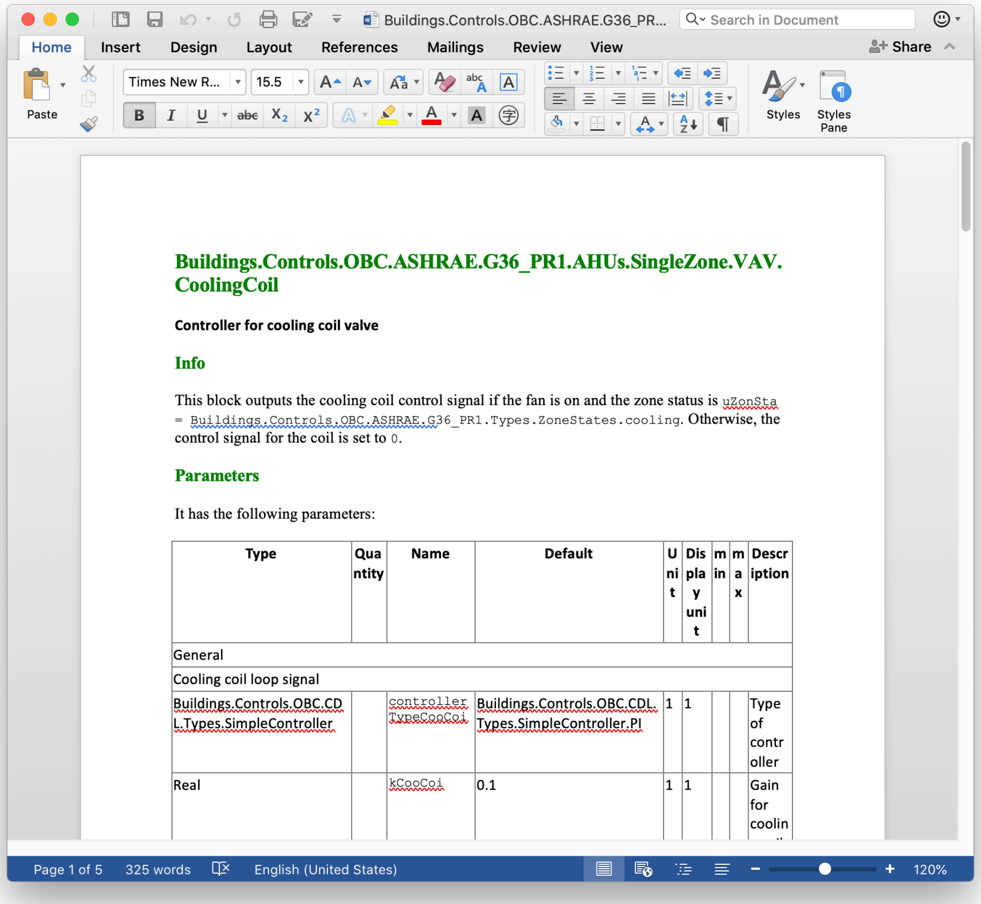
Buildings.Controls.OBC.CDL.Logical.Switch	`switch`	Switch to assign cooling coil control signal	
Buildings.Controls.OBC.CDL.Continuous.Sources.Constant	`const`	Cooling off mode	`k = 0`
Buildings.Controls.OBC.CDL.Logical.And	`and2`	Conditions for cooling state	

1.6. Connections

The inputs of the internal blocks are connected to the following outputs:

1. const`.y` → switch`.u3`
2. switch`.u1` → cooCoiPI`.y`
3. cooCoiPI`.trigger` → uSupFan
4. cooCoiPI`.u_s` → TSupCoo
5. cooCoiPI`.u_m` → TSup
6. switch`.y` → yCooCoi
7. intEqu`.y` → and2`.u1`
8. and2`.u2` → uSupFan
9. and2`.y` → switch`.u2`
10. conInt`.y` → intEqu`.u1`
11. uZonSta → intEqu`.u2`

- How to generate point list:
  - Could we have "Boolean" interfaces as DI/DO, and "Real/ Integer" Interfaces as AI/AO?
  - What the "Type" interface should be?
  - Do we need to specify hardware / software point type?
- How to layout the document.
- Your convention of document the sequences
- Tag the point: Brick



Buildings.Controls.OBC.ASHRAE.G36_PR1.AHUs.SingleZone.VAV.CoolingCoil

Controller for cooling coil valve

Info

This block outputs the cooling coil control signal if the fan is on and the zone status is `uZonSta = Buildings.Controls.OBC.ASHRAE.G36_PR1.Types.ZoneStates.cooling`. Otherwise, the control signal for the coil is set to `0`.

Parameters

It has the following parameters:

Type	Quantity	Name	Default	Unit	Display unit	min	max	Description
General								
Cooling coil loop signal								
Buildings.Controls.OBC.CDL.Types.SimpleController		`controllerTypeCooCoi`	Buildings.Controls.OBC.CDL.Types.SimpleController.PI	1	1			Type of controller
Real		`kCooCoi`	0.1	1	1			Gain for coolin

Generate html:

```
node app.js -f models/CoolingCoil.mo -o html
```

Generate docx:

```
node app.js -f models/CoolingCoil.mo -o docx
```