BERKELEY LAB
Bringing Science Solutions to the World

IBPSA Project 2

BOPTEST

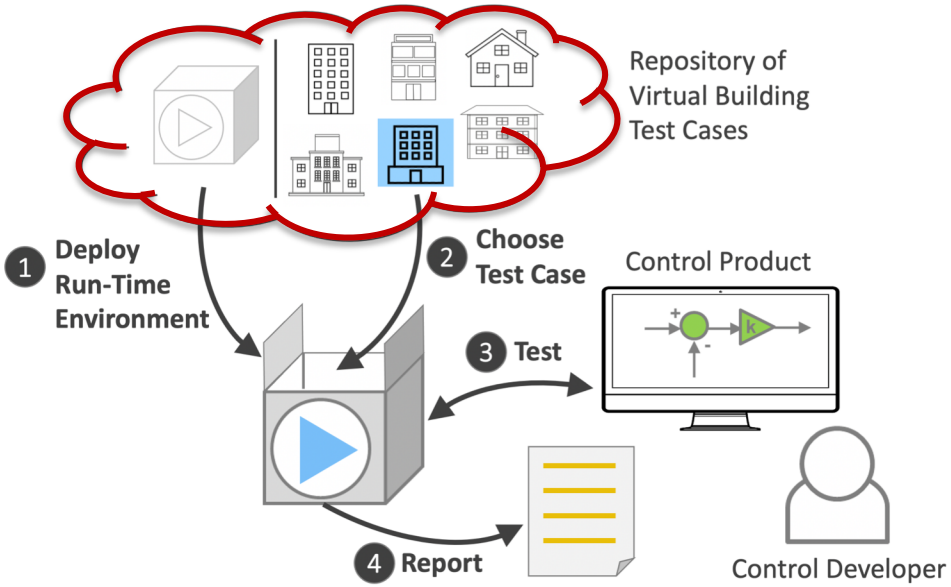
U.S. DEPARTMENT OF ENERGY
Office of Science

BS2025 workshop. IBPSA Project 2 Task 3: test case development

Ettore Zanetti ezanetti@lbl.gov

8/28/25

Test Cases Technical objectives



This task focuses on development and maintenance of benchmark test cases. Test case development utilizes the Modelica language and Functional Mockup Interface (FMI) standard.

All models use open-source libraries that extend from the Modelica IBPSA Working Group.

IBPSA Modelica working group

An Expanding Repository of Test Cases

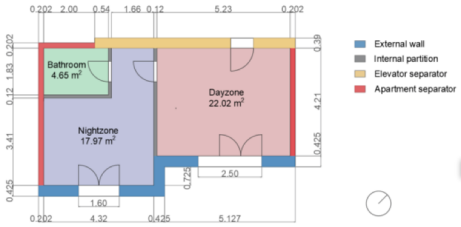
8 test cases available in v0.8, 1 available in next releases, 4 under development
4 air based systems, 5 hydronic, and 4 hybrid
8 commercial and 5 residential buildings

<id>_<building type>_<HVAC>_<#zones>_ <city>

TC1_Office_Air_1zon_Denver 1 Zone, FCU	**TC2_House_Hydro_1zon_Brussels** 1 Zone, Radiator
TC3_House_Hydro_1zon_ Brussels 1 Zone, Radiant Floor, Heat Pump	**TC4_University_Hybrid_1zon_ Copenhagen** 1 Zones, DH, DCV AHU
TC5_Apartment_Hydro_2zon_ Milan 2 Zones, Radiant Floor, Heat Pump	**TC6_House_Hydro_6zon_Bordeaux** 6 Zones, Radiators, Boiler
TC7_Office_Air_5zon_Chicago 5 Zones, 1 VAV AHU, Heat Pump, Chiller	**TC8_Office_Hybrid_2zon_Brussels** 2 Zones, Radiators, FCU, Heat pump
TC9_Office_Air_15zon_Chicago 15 Zones, 3 VAV AHUs, Boiler, Chiller	**TC10_Testbed_Air_10zon_ Tennessee** 10 Zones, 1 VAV RTU, DX, Ele. Heat
TC11_School_Hybrid_25zon_Quebec 25 zones, RTUs, AHU, VAV, radiators and high T TES	**TC12_House_Hydro_12zon_Copenhagen** 12 zones, radiator, floor heating, heat pump
TC13_School_Hybrid_37zon_Copenhagen 37 zones radiator, district heating, AHU for ventilation	

Available in v0.8 | Available in next releases | Under development

Test case development: Peer Review



External wall

N	Description	x [m]	k [W/(mK)]	c [J/(kg K)]	d [kg/m³]	absIR [-]	absSol [-]
1	Exterior plaster	0.005	0.300	840	1300	0.9	0.6
2	EPS 120 thermal insulation panel	0.1	0.034	1250	23	-	-
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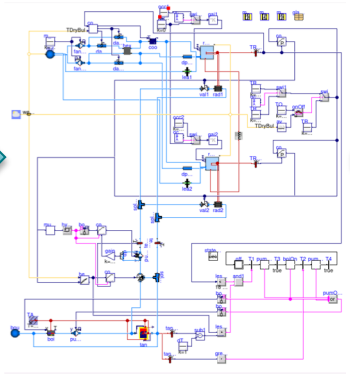
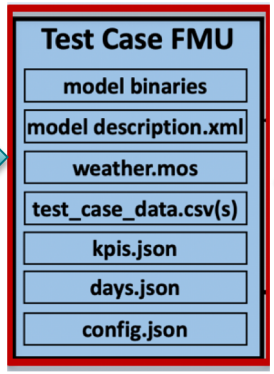




Data collection

Model development

Make test case BOPTEST ready

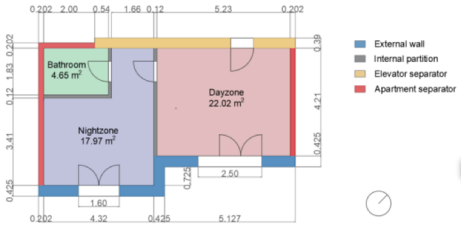
Test case peer review

- Realistic building configuration, envelope properties, and internal gains

Resources:

- Create cheat sheet with ”typical” values

Test case development: Peer Review



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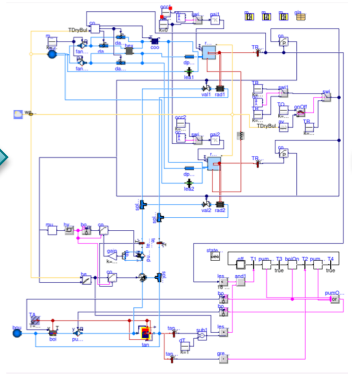

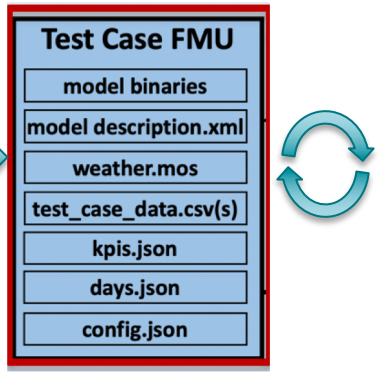

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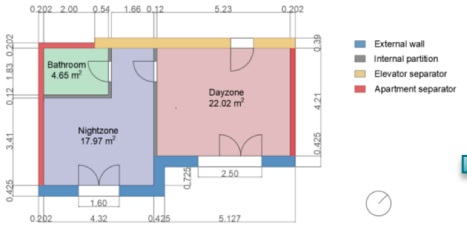

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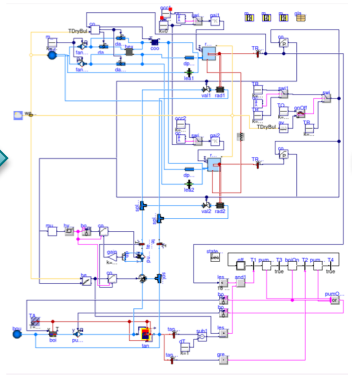

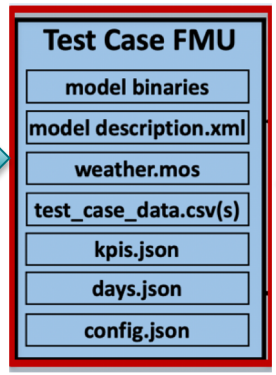

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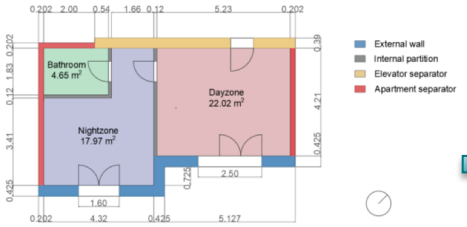

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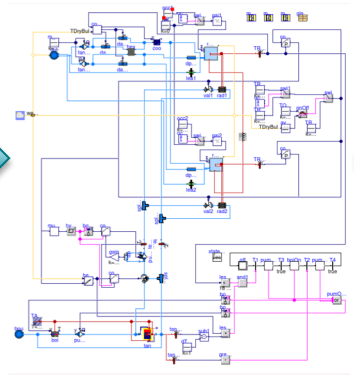

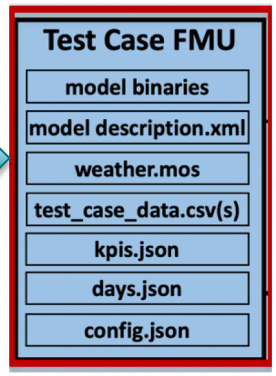

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Test case peer review

- Every test case needs a second pair of eyes.

Resources:

- review document
- Test case stress test script

JOIN us! Any questions?

Thank you!
Any Questions?

Email: ezanetti@lbl.gov