pyCity Demo

Demonstration of pycity package and its usage

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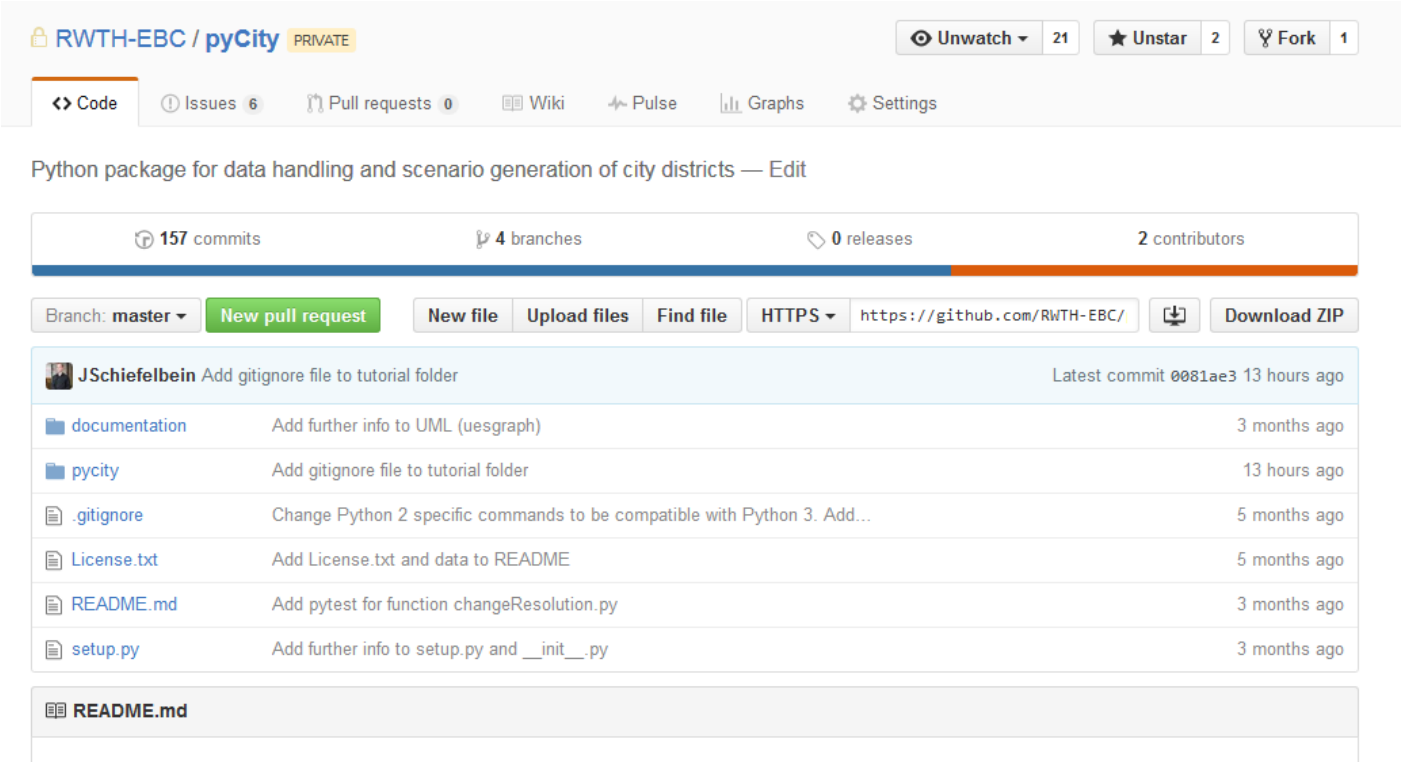
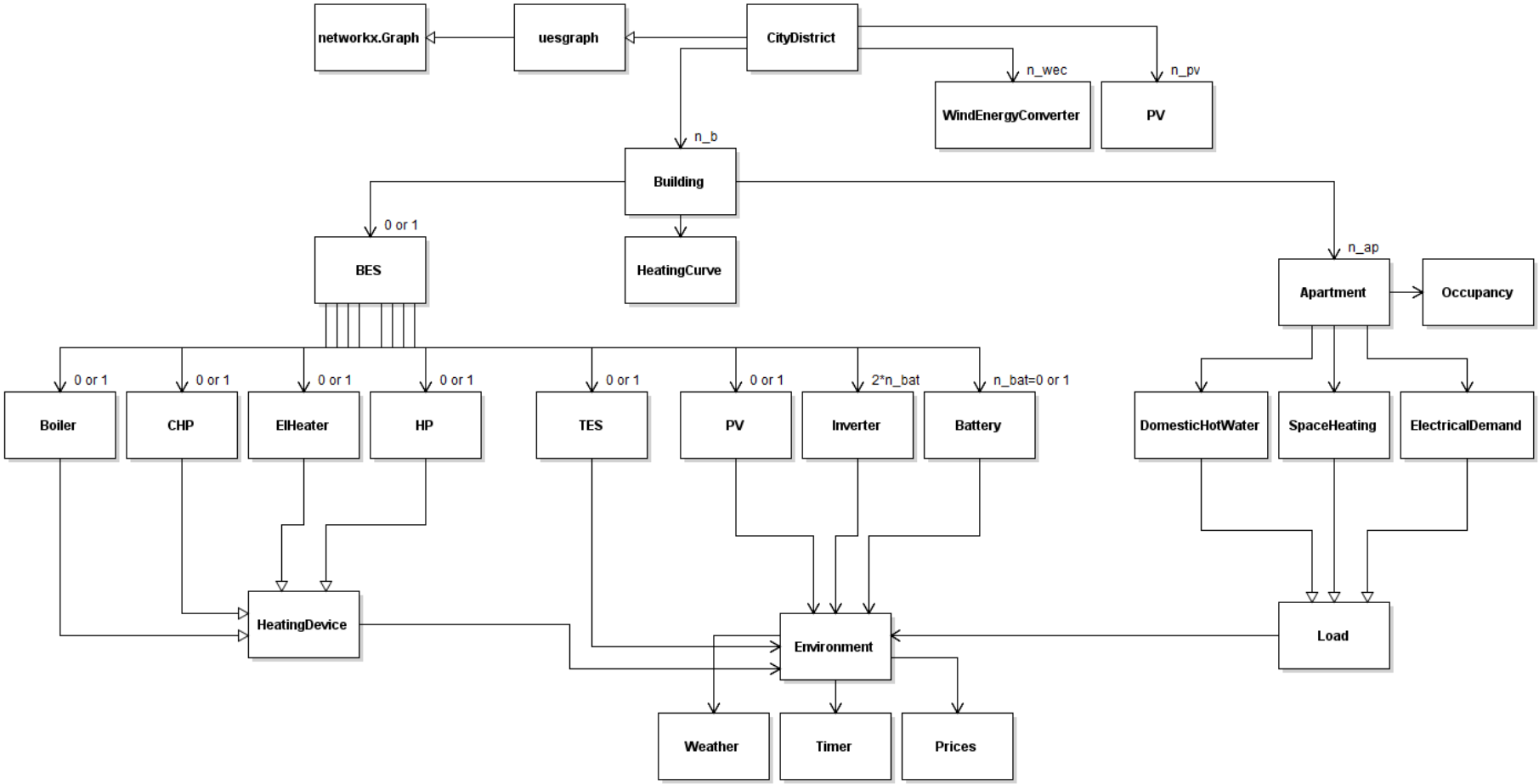
What is pyCity?

- Python package
- Developed at EBC/ACS
- For city district generation and data handling
- Development via GIT on Github (https://github.com/RWTH-EBC/pyCity)

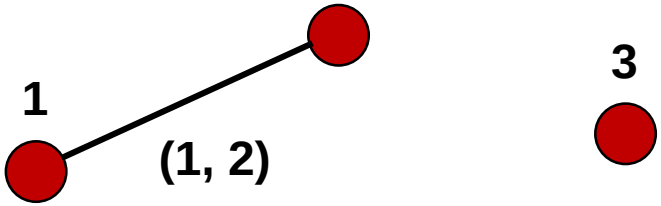


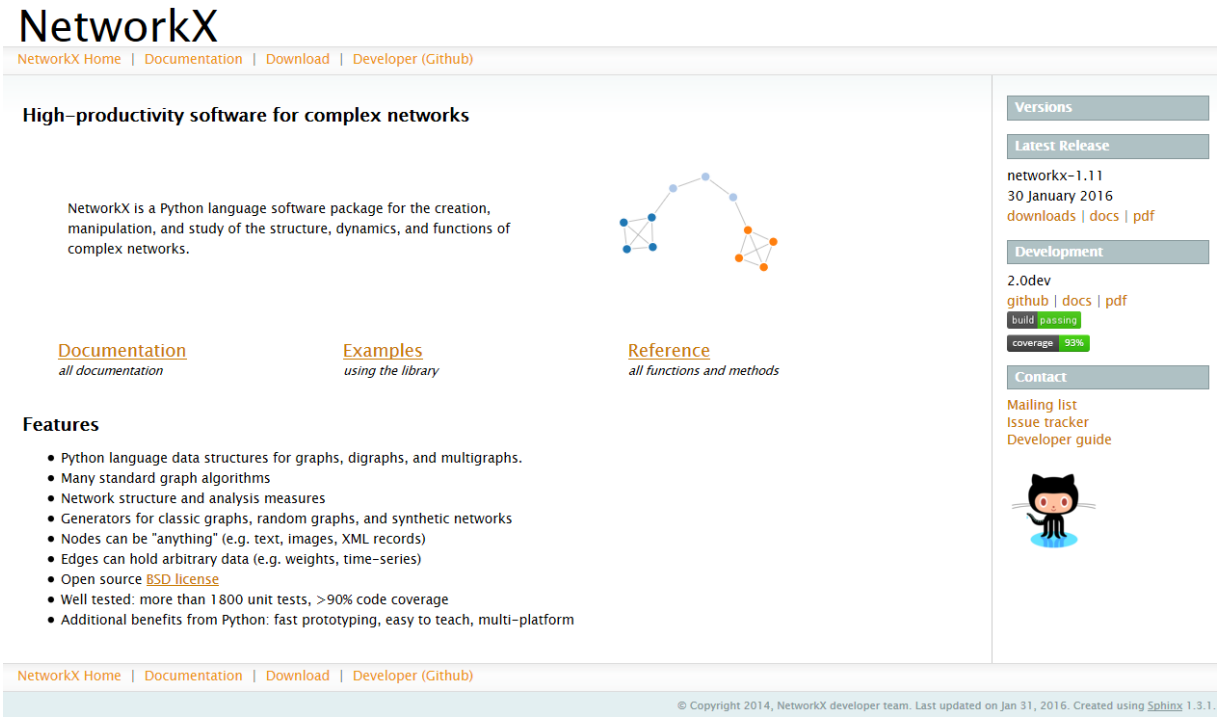
pyCity UML-Structure



pyCity dependencies

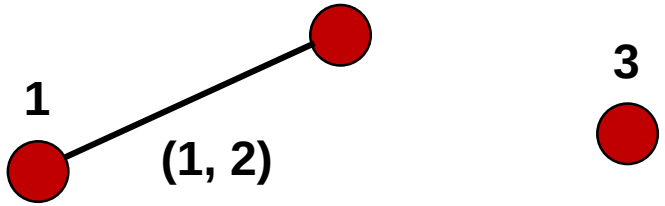
Networkx → Package for mathematical graphs (https://networkx.github.io/)



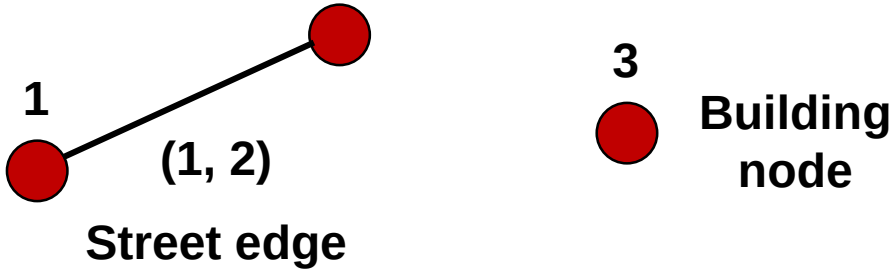


pyCity dependencies

Networkx → Package for mathematical graphs



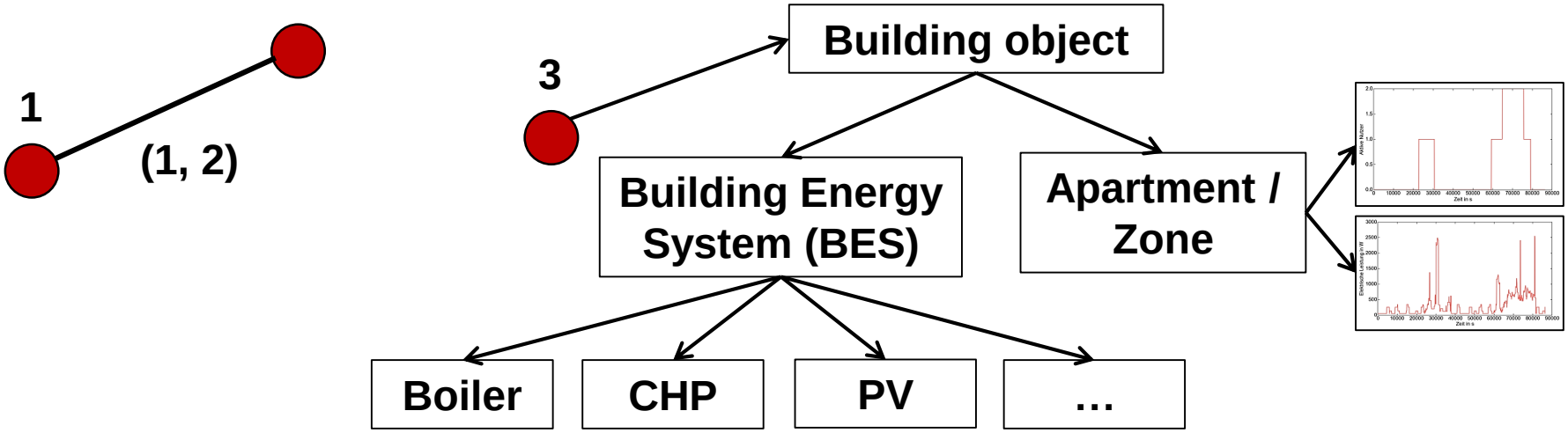
Uesgraphs → Topology of city district energy systems (https://github.com/RWTH-EBC/uesgraphs)



pyCity dependencies

pyCity main package

→ City district generator and data handling



→ Includes occupancy and load profiles as well as energy systems

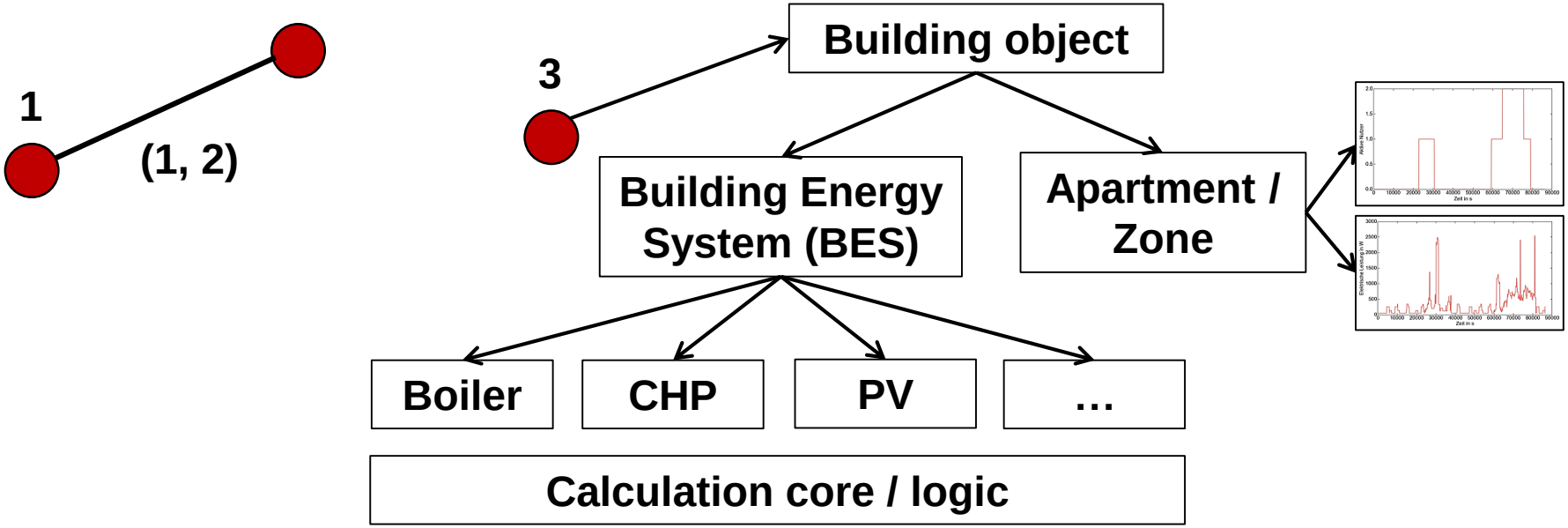
→ However: No calculation core! Only generation and data handling

→ Everyone can extend pycity with own logic and functions

→ High flexibility

PyCity_Calc

→ PyCity Addon – Energiebilanz und Wirtschaftlichkeitsrechner

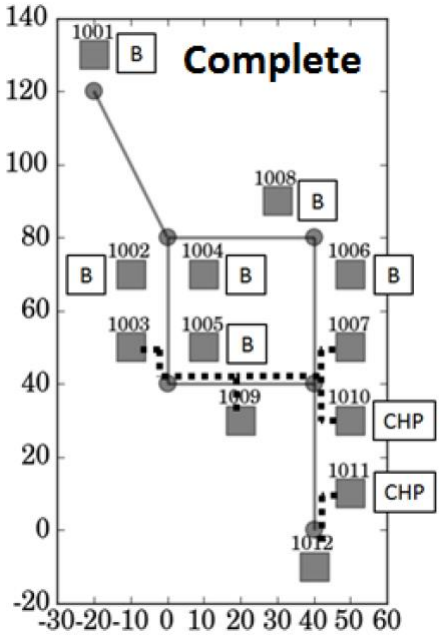


→ Logic (e.g. methods for energy system control, energy balance calculation…)

→ Annual basis (full year analysis)

City district optimization

- Mixed integer linear programming (MILP) in gurobipy
- Objective function: Min. cost or min. CO_2 emissionen
- Input: City Objekt or city.csv + TRY + SLP
- Decision variables: Energysystems
  - Place
  - Type
  - Nominal power / capacity
  - Grid infrastructure (LHN, DEG)
- Constraints
  - Economic: VDI 2067
  - Technical: Efficiency-curves, part load behavior, power limitations, energy loss calculation, on-off-switching limits…



pyCity Tutorial via Jupyter Notebook

- Interactive python environment
- Test and modify code on the fly