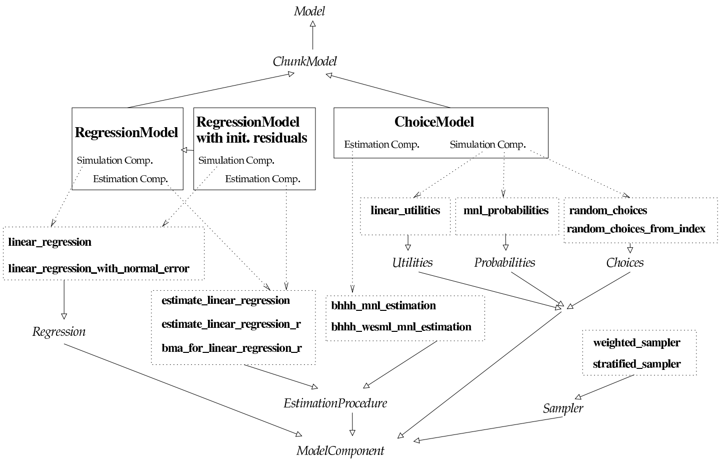
Models in opus_core



Simulation and Estimation

□ **Simulation:** (opus_core/tools)

```
start_run.py -c configuration
            (-x xml_configuration)
restart_run.py run_id start_year
```

□ **Estimation:** (urbansim/tools)

```
start_estimation.py arguments
```

Arguments:

```
-m model
[--group=model_group]
-s specification
-c configuration
[--save-results]
[-i]
```

Model Specification

```
specification = {
    model_group_1: {
        "_definition_": [all variables/expressions] ,
        submodel_1:    [selected variables/aliases] ,
        submodel_2:    [selected variables/aliases] ,
             ⋮
    },
    model_group_2: {
         ⋮
    },
    ⋮
}
```

Calibration

Comparison of multiple runs with respect to observed outputs → Bayesian Melding (Ševčíková et al. TRB 2007)

Cache directories:

```
run_1_.../2000
          /2001
              ⋮
run_2_.../2000
              ⋮
run_3_.../2000
              ⋮
```

Differences between runs: random seed, coefficient values, specification, model structure, set of models

Bayesian Melding

Implemented in class BayesianMelding

Inputs:

□ file 'cache_directories'
□ observed data
□ quantities of interest (as variables or expressions)
□ calibration year

Outputs:

□ weights (one per run)
□ estimated model bias $\hat{a} = \frac{1}{IK} \sum_{i,k} (y_k - \mu_{ik})$
□ estimated variance (one per quantity of interest) $\hat{\sigma_i}^2 = \frac{1}{K} \sum_k (y_k - \hat{a} - \mu_{ik})^2$

The class allows to simulate from the posterior distribution of outputs.