



BASEMENT

Introducing BASEMENT Version 4

8. BASEMENT Users Meeting 2023

Matthias Bürgler

Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zurich



Outline

- Concept of BASEMENT Version 4
- How to migrate a BASEMENT v2 Simulation
- How to migrate a BASEMENT v3 Simulation
- How to set up a BASEMENT v4 Simulation
- Conclusion



Concept of BASMENT Version 4

BASEMENT v2

- Multi-domain (MD) version including BASEchain, BASEplane, BASEsub, Coupling, Controller, etc.
- Monolithic workflow

BASEMENT v3

- High performance computing (HPC) version limited to BASEplane (2D)
- Modular workflow



Concept of BASEMENT Version 4

BASEMENT Version 4

BASEMD
(multi-domain)



BASEHPC
(high-perf. Comp.)

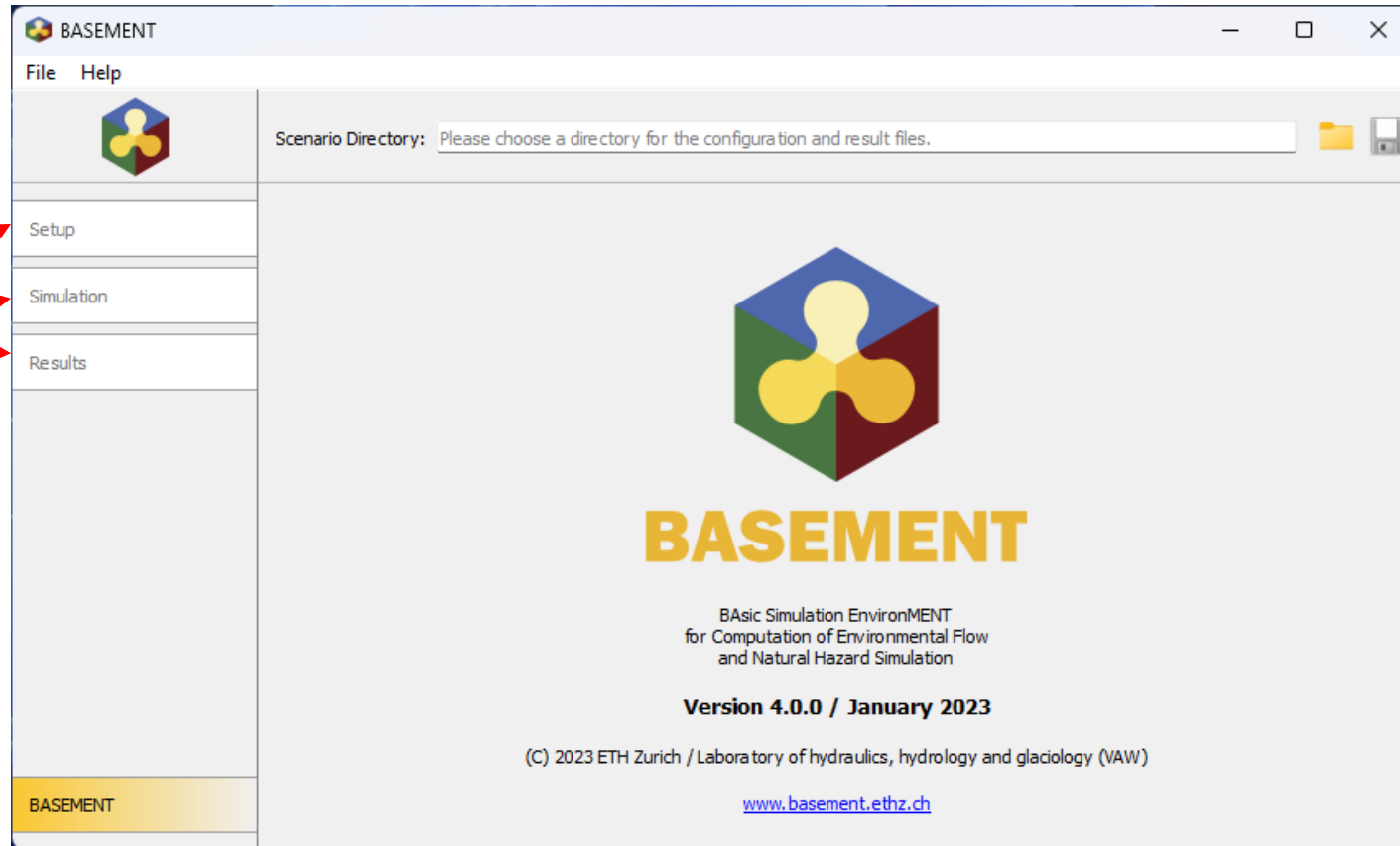
- Consolidation of versions 2 and 3 as separate modules (BASEMD and BASEHPC)
- One unified GUI, workflow and command file structure
- Partially unified output format



Concept of BASMENT v4

Graphical User Interface (GUI)

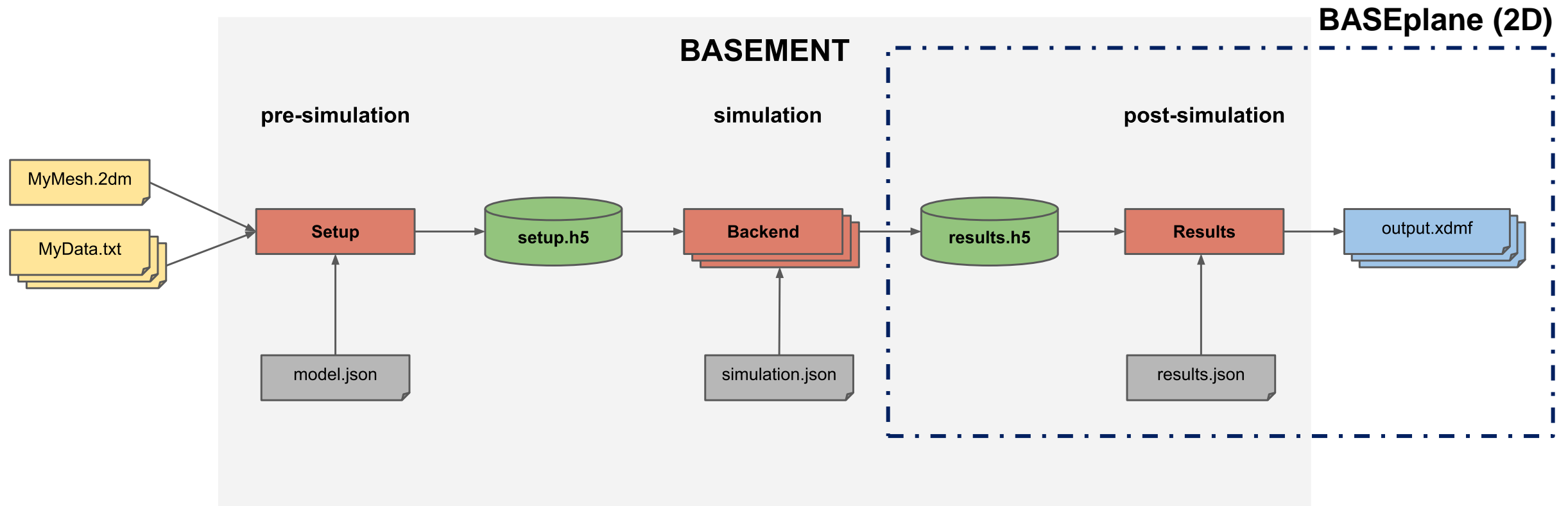
Workflow





Concept of BASEMENT v4

Modular workflow and JSON command files





Concept of BASMENT v4

JSON command files

- Module choice within model.json

BASEMENT

BASEplane (2D)

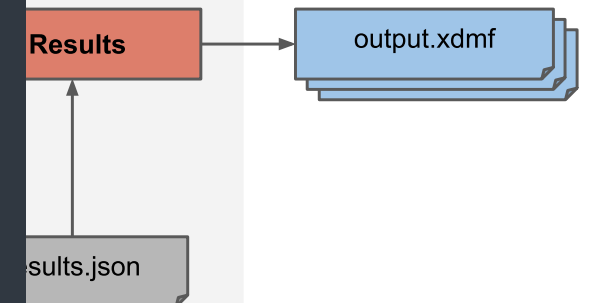
pre-simulation

simulation

post-simulation

```
{
  "SETUP":{
    "simulation_name":"myMDsim",
    "BASEMD": {
      "PHYSICAL_PROPERTIES": {},
      "BASEPLANE_2D": {
        "GEOMETRY": {},
        "HYDRAULICS": {
          "PARAMETER": {},
          "INITIAL": {}
        }
      }
    }
  }
}
```

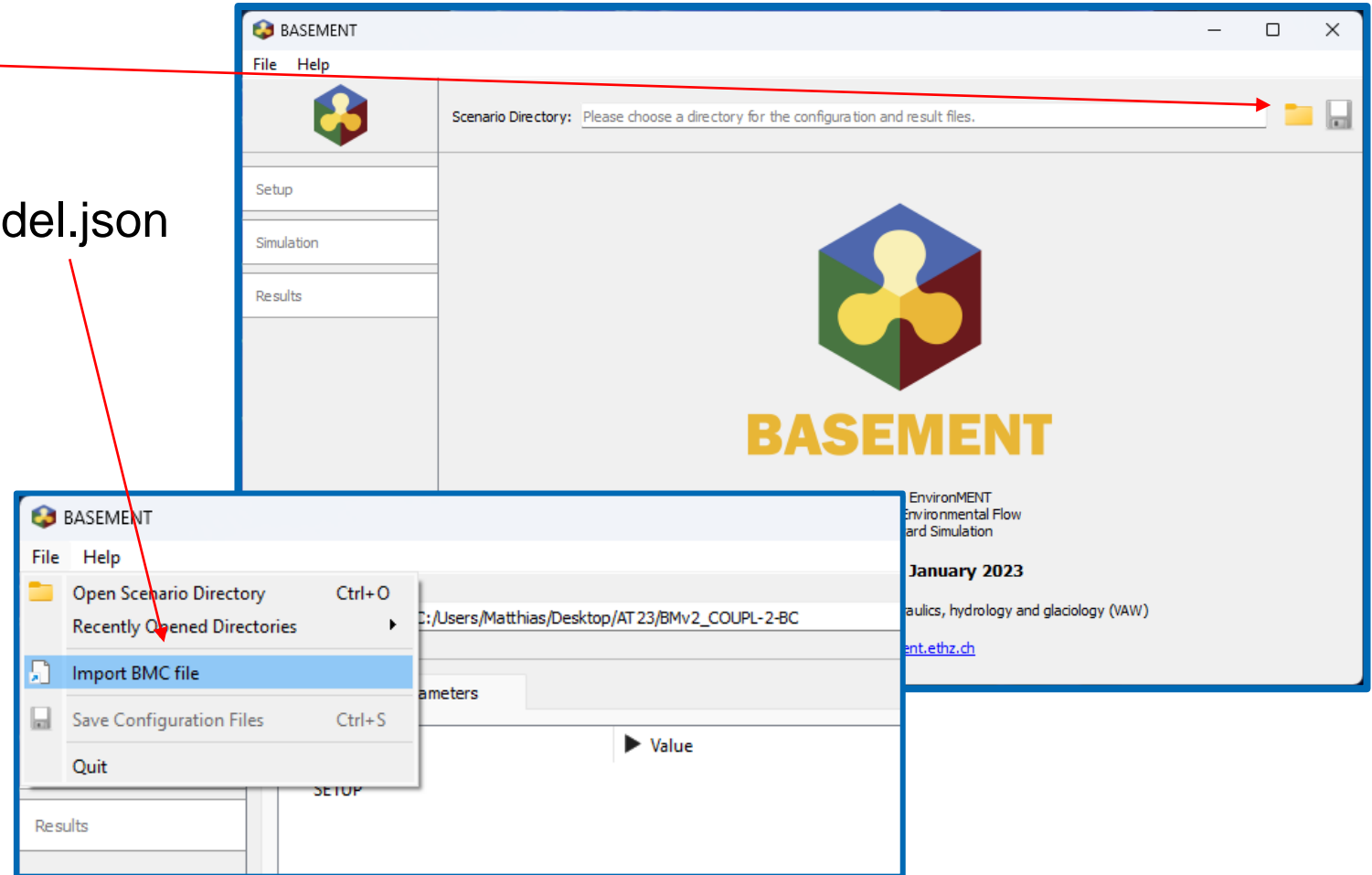
```
{
  "SETUP":{
    "simulation_name":"myHPCsim",
    "BASEHPC": {
      "PHYSICAL_PROPERTIES": {},
      "BASEPLANE_2D": {
        "GEOMETRY": {},
        "HYDRAULICS": {
          "PARAMETER": {},
          "INITIAL": {}
        }
      }
    }
  }
}
```





How to migrate a BASEMENT v2 Simulation

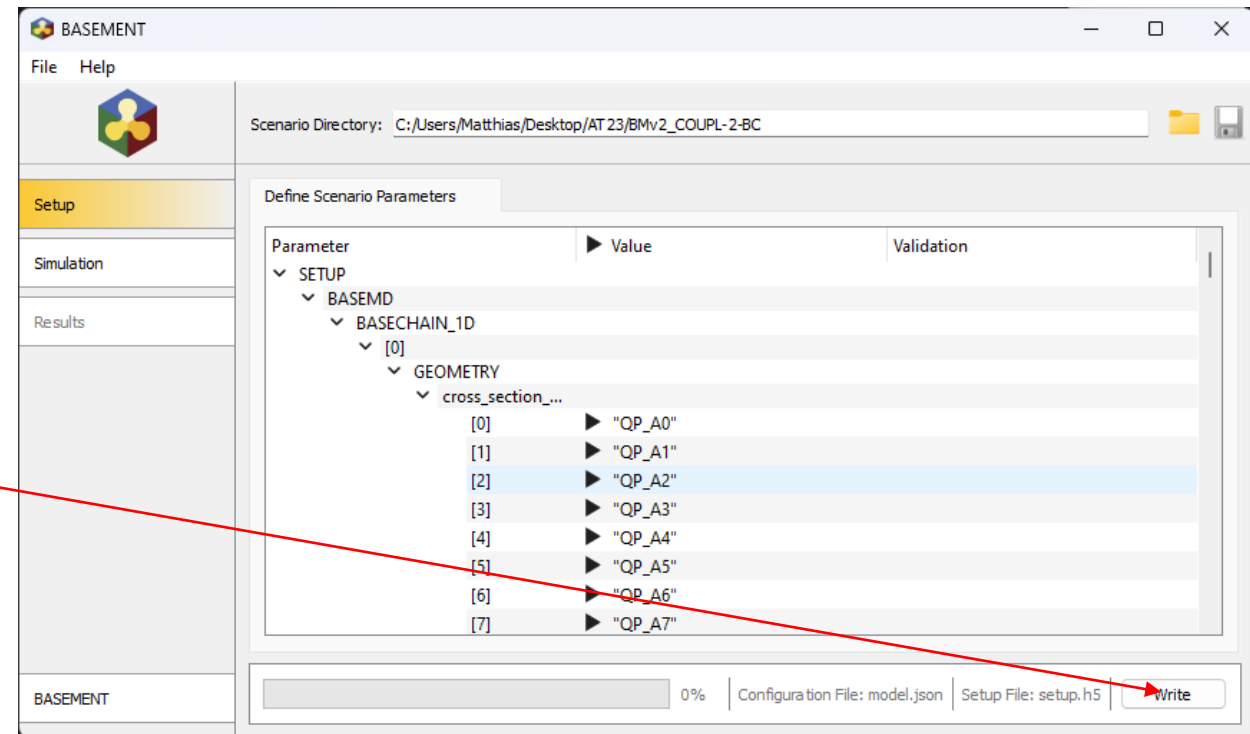
1. Select scenario directory
2. Import BMC file and convert to model.json





How to migrate a BASEMENT v2 Simulation

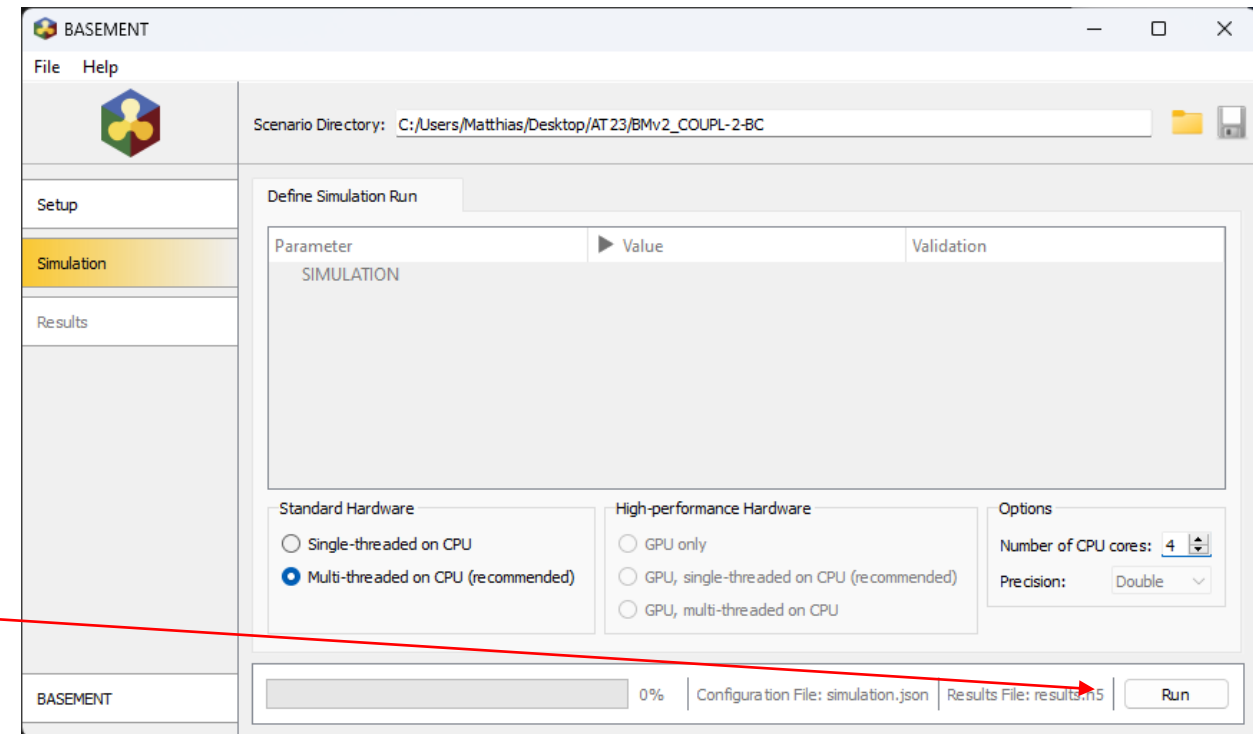
1. Select scenario directory
2. Import BMC file and convert to model.json
3. Write setup (setup.h5)





How to migrate a BASEMENT v2 Simulation

1. Select scenario directory
2. Import BMC file and convert to model.json
3. Write setup (setup.h5)
4. Select hardware and run simulation
5. Run results (only for BASEPLANE_2D)





How to migrate a BASEMENT v2 Simulation

Limitations

- CNGS restart files deprecated in v4
- Use of initial conditions from .cgns files not possible

→ Converter for initial conditions from .cgns to .h5 files will be provided as a Python script

Outlook

- 1D Grid editor will be included for release



How to migrate a BASEMENT v3 Simulation

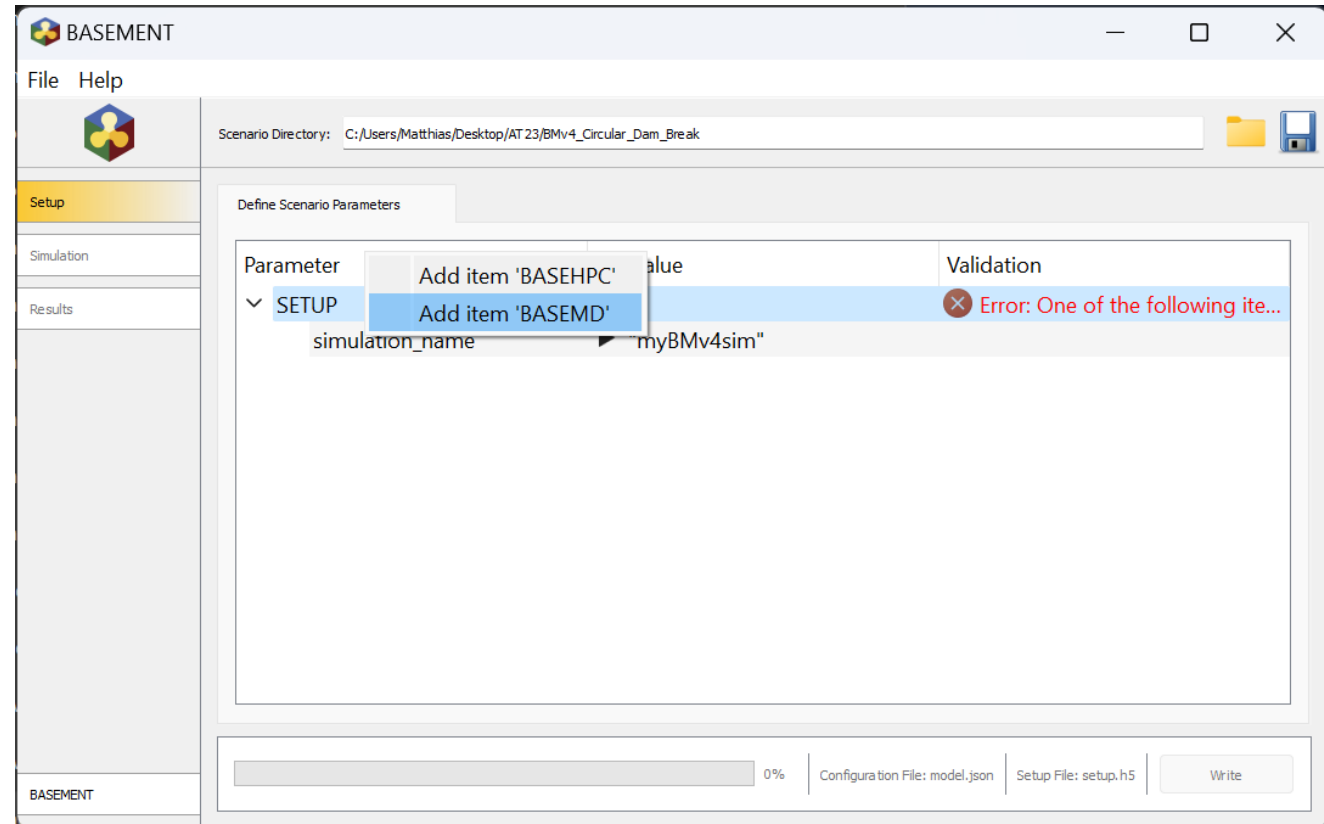
1. Open model.json in Text-Editor
2. Replace DOMAIN with BASEHPC
3. Continue with Setup, Simulation and Results

```
{
  "SETUP": {
    "simulation_name": "CDB_10k",
    "DOMAIN": { ← BASEHPC
      "PHYSICAL_PROPERTIES": {
        "gravity": 9.81
      },
      "BASEPLANE_2D": {
        "GEOMETRY": {
          "mesh_file": "circ_damb_toro_10k_GPU.2dm",
          "REGIONDEF": [
            {
              "name": "one",
              "index": [
                1
              ]
            }
          ]
        }
      }
    }
  }
}
```



How to set up a BASEMENT v4 Simulation in GUI

1. Open GUI
2. Select BASEMD or BASEHPC module during Setup
3. Complete Setup according to selected module
4. Run Simulation and Results





Conclusion

- BASEMENT Version 4 is a consolidation of versions 2 and 3 as separate modules (BASEMD and BASEHPC) with one unified GUI, workflow and command file structure
- Reduce maintenance effort while preserving features of version 2
- Improvement user experience
- Migration guide will be available in the user manual at release