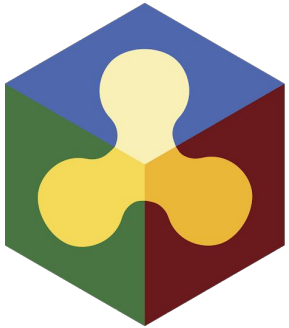

BASEMENT

Workflow, configuration data and graphic user interface

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HSR HOCHSCHULE FÜR TECHNIK RAPPERSWIL
FHO Fachhochschule Ostschweiz

Outline

- BASEMENT main features
- Modelling procedure
- Numerical simulation workflow
- Example: Circular dam break
- BASEMENT graphical user interface

BASEMENT main features

BM v2.x

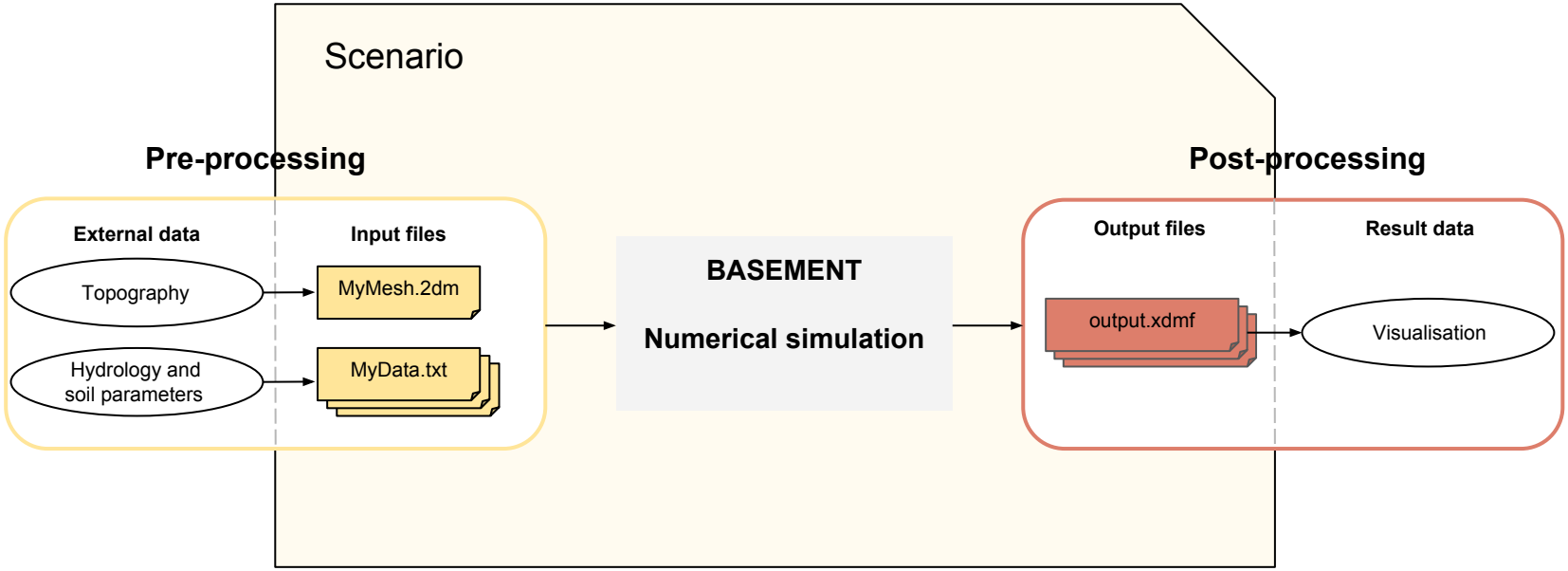
vs

BM v3.x

	Version 2.8	Version 3.0
1-D model	✓	
2-D model	✓	✓
Hydrodynamics	✓	✓
Morphodynamics:		
- Bed load	✓	✓
- Suspended load	✓	
External sub-domain	✓	
Model coupling (multi domain)	✓	
Controller	✓	
Subsurface flow	✓	
Vegetation	✓	
SMP hardware	✓	✓
GPU/HPC support		✓[1]

[1] Linux only

Modeling procedure



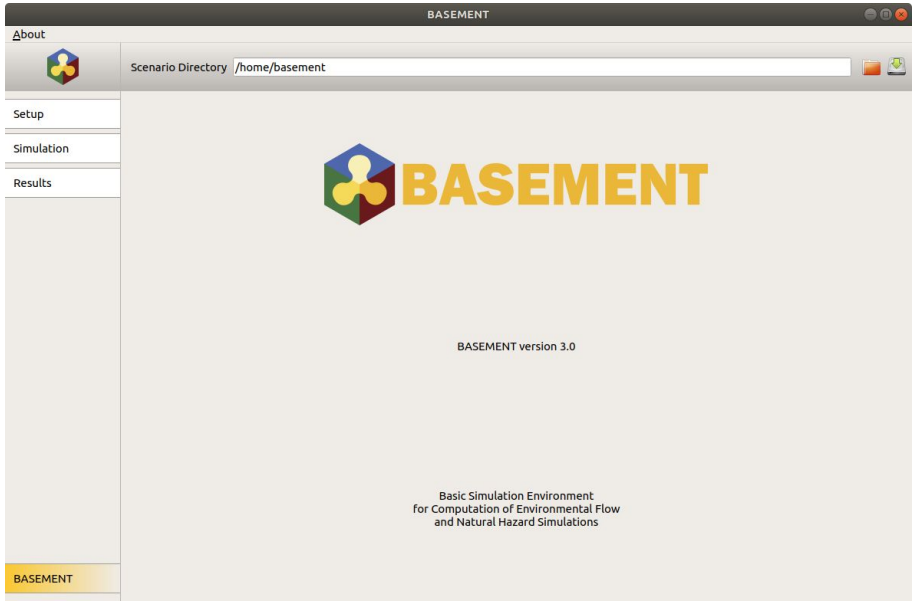
Numerical simulation workflow

BASEMENT

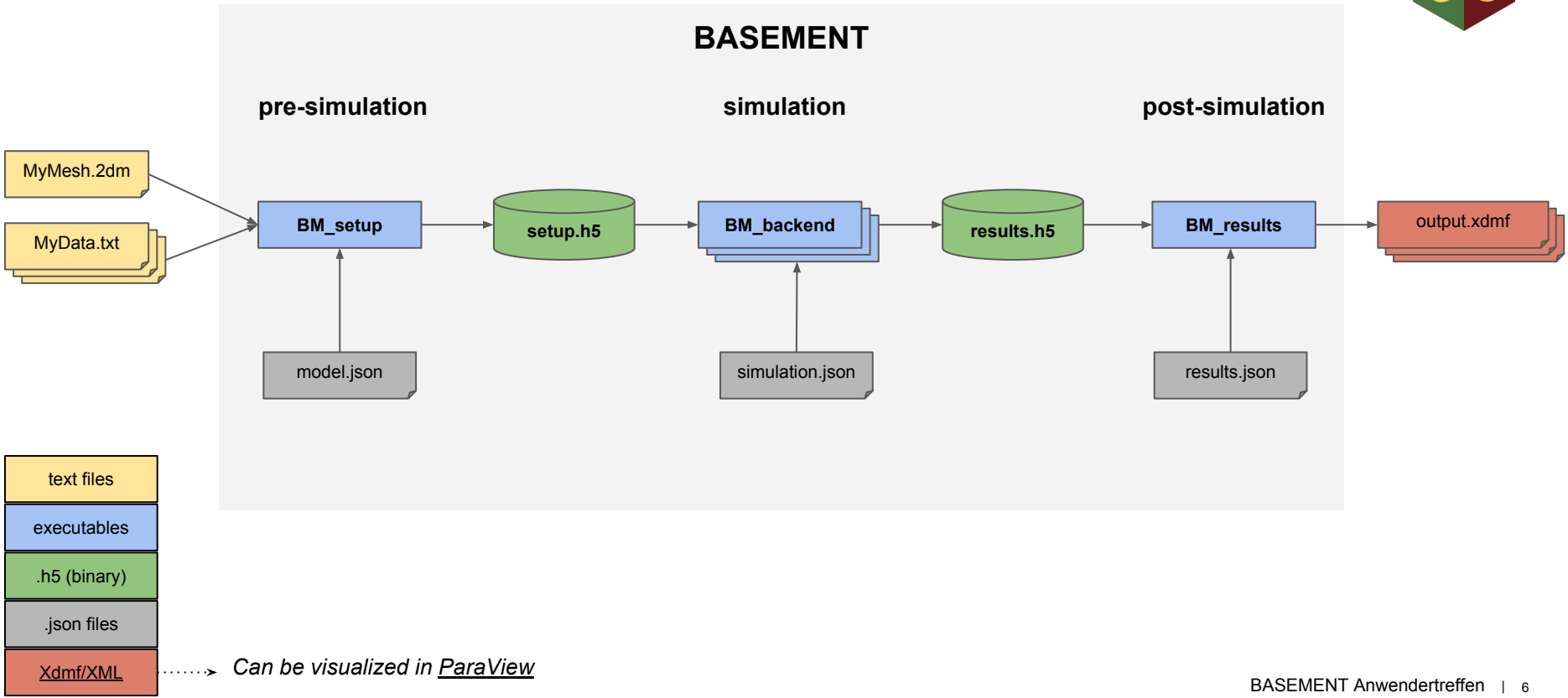
Numerical simulation

1. Pre-simulation
2. Simulation
3. Post-simulation

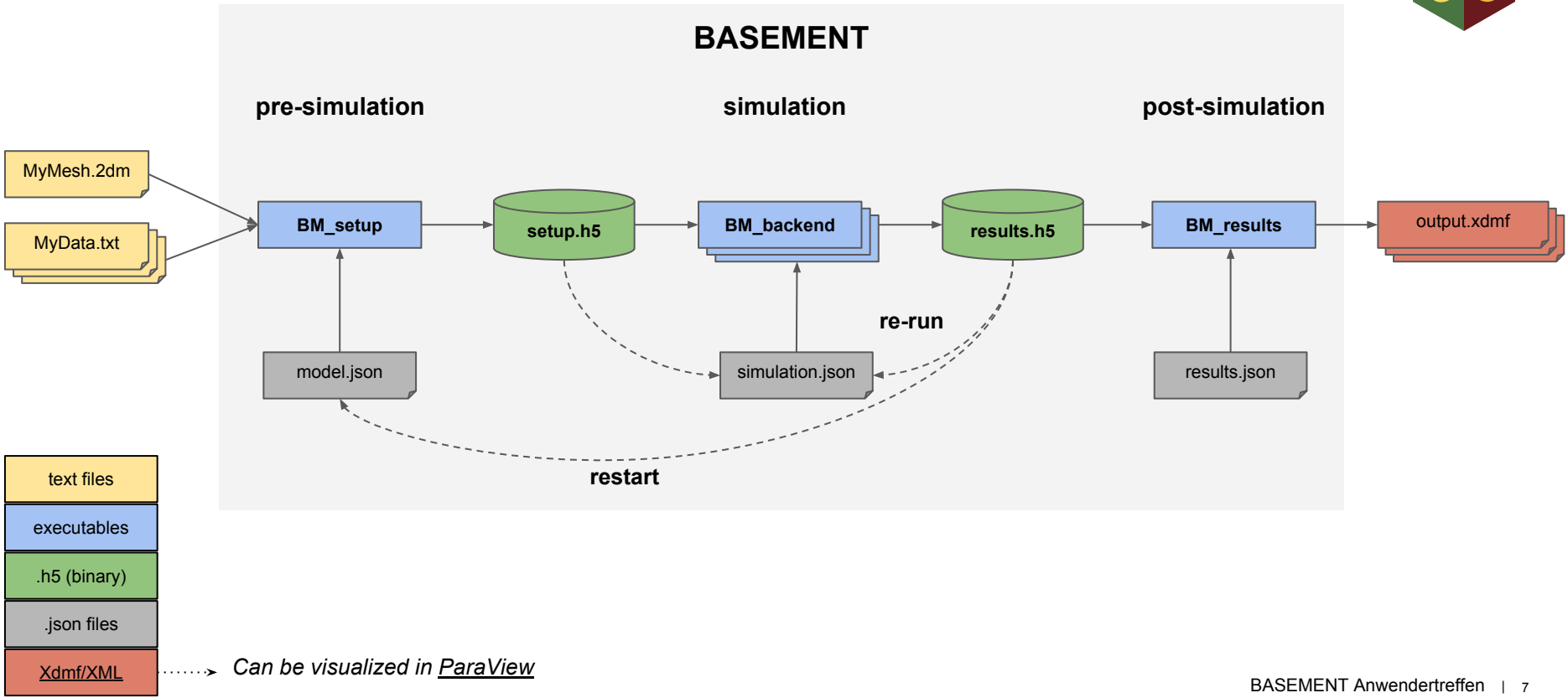
Graphical user interface (GUI)



Modeling framework



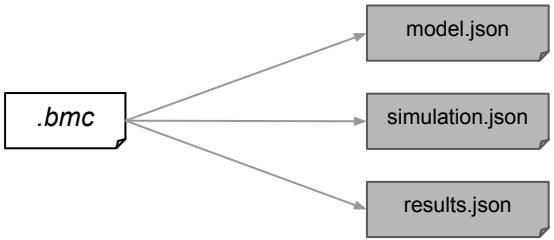
Re-run and restart a simulation



Comparison of command files

vs

BM2.8 *BM3.0*



Example: Circular dam break

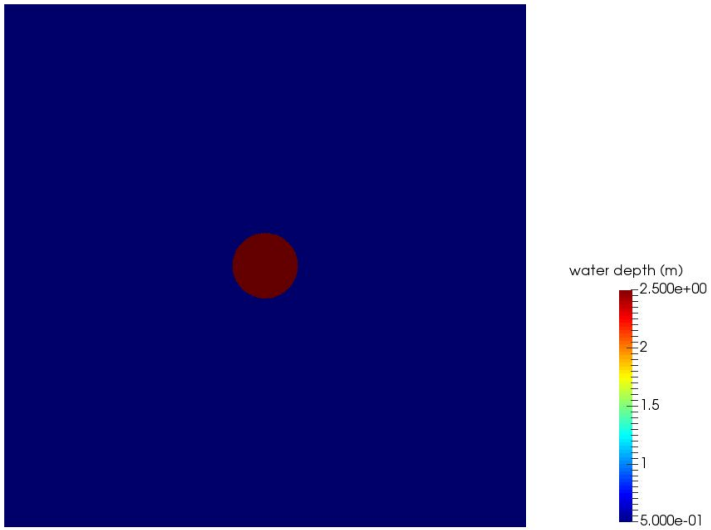


Figure 1: Initial conditions for circular dam break

Table 1: Parameters for circular dam break

Domain area	40 x 40 m
Dam diameter	5 m
Friction	-
Slope	-
Boundary conditions	Wall

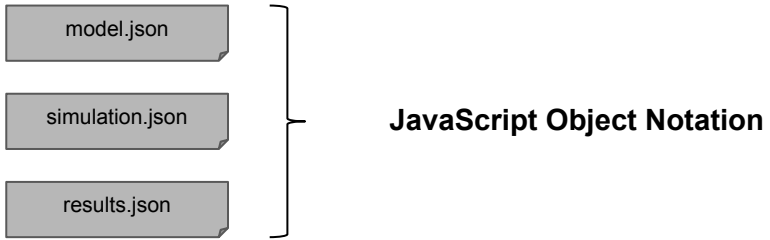
BMC command file

.bmc

```
DOMAIN {
   PHYSICAL_PROPERTIES {
      gravity    = 9.81
      viscosity = 1.0
      (...)}
      BASEPLANE_2D {
         region_name = H_1
         GEOMETRY {
            type = 2dm
         (...)}
         HYDRAULICS {
            INITIAL {
               index = ( 1   2   )
            (...)}
         (...)}
         OUTPUT {
            console_time_step = 100.0
         (...)}
      (...)}
   (...)}
(...)}
```

Test: Circular dam break

JSON configuration files



.json

```
{
   “array”: [1, 2, 3],
   “boolean”: true,
   “number”: 123,
   “object”: {
      “a”: “b”,
      “c”: “d”,
      “e”: “f”
   },
   “string”: “Hello World”
}
```

JSON configuration

model.json

simulation.json

results.json

.json

```
{
   "SETUP": {
      "DOMAIN": {
         "PHYSICAL_PROPERTIES": {
            "gravity": 9.81
         (...)},
         "BASEPLANE_2D": {
            "GEOMETRY": {
               "mesh_file": "mesh.2dm"
            (...)},
            "HYDRAULICS": {
               "INITIAL":{
                  "regions": [{(...)}, {(...)}]
               (...)}
            (...)}
         (...)}
      (...)}
   (...)}
```

Test: Circular dam break

JSON configuration

model.json

simulation.json

results.json

.json

```
{
   "SIMULATION": {
      "TIME": {
         "start": 0.0,
         "end": 3.5,
         "out": 0.5
      },
      "OUTPUT": [
         "water_surface",
         "spec_discharge",
         "water_depth"
      ]
   }
}
```

Test: Circular dam break

JSON configuration

model.json

simulation.json

results.json

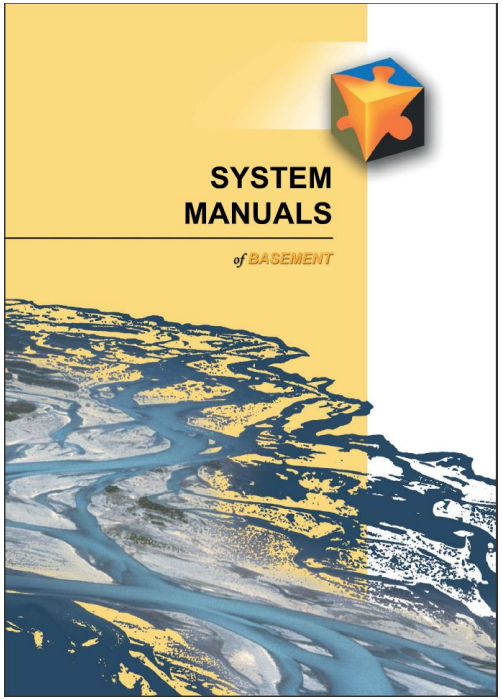
.json

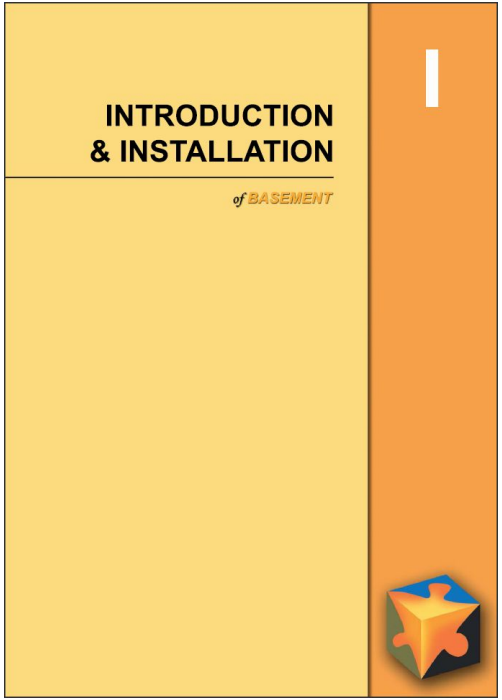
```
{
   "RESULTS": [
      {
         "name": "2_A_run",
         "format": "xdmf"
      }
   ]
}
```

Test: Circular dam break

More features

New documentation:

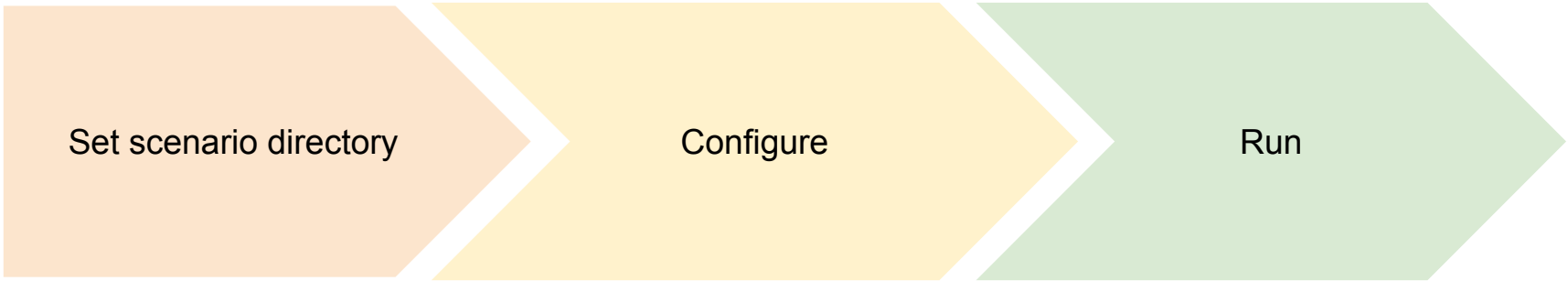




- Migration guide version 2.8 to 3.0
- Summary of features

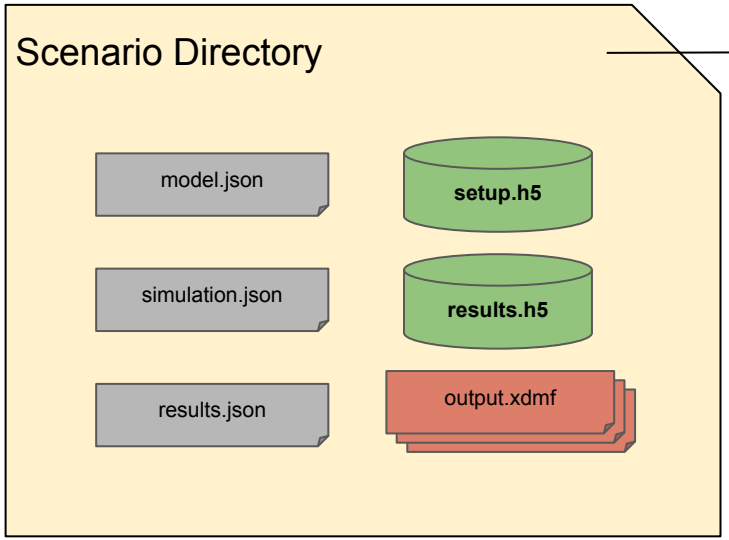
BASEMENT Graphical User Interface

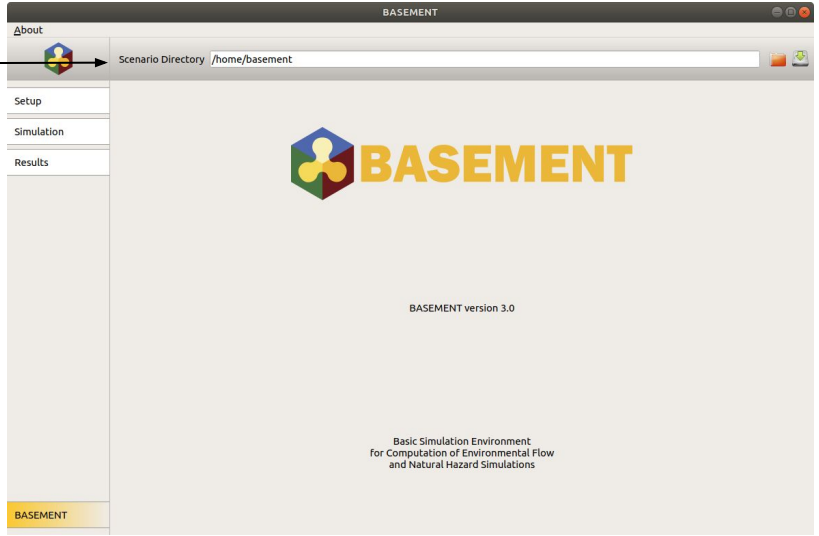
The UI guides you through running a simulation with BASEMENT.



Scenario Directory

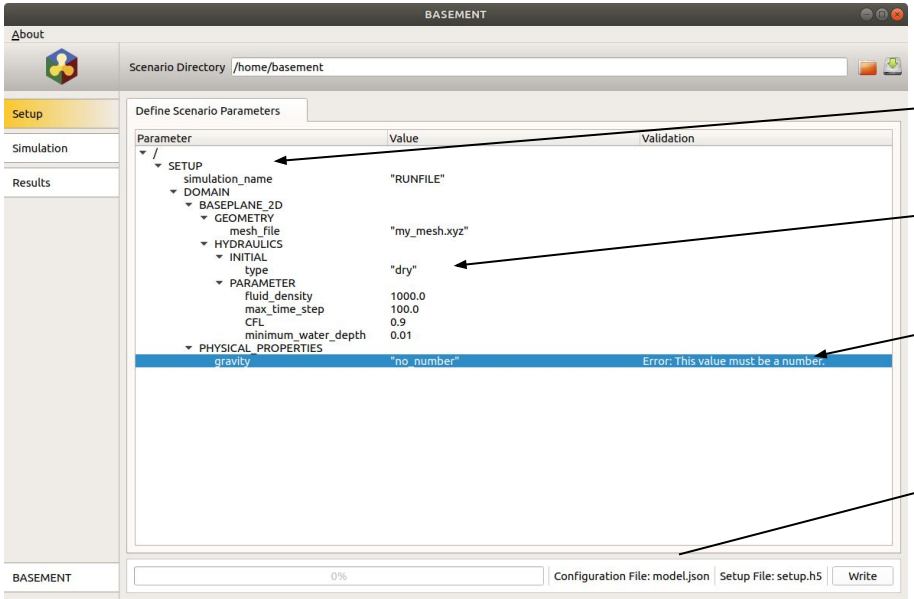
The scenario directory contains all the files for a specific simulation scenario.





Configure setup, simulation, and results

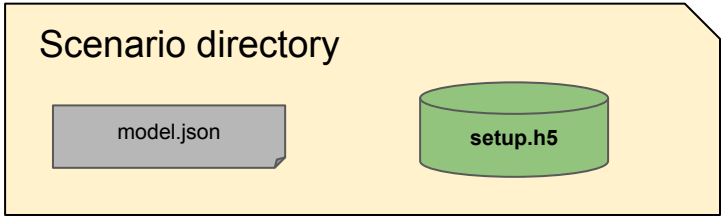
Define the scenario parameters using the JSON editors.



Tree view of parameters

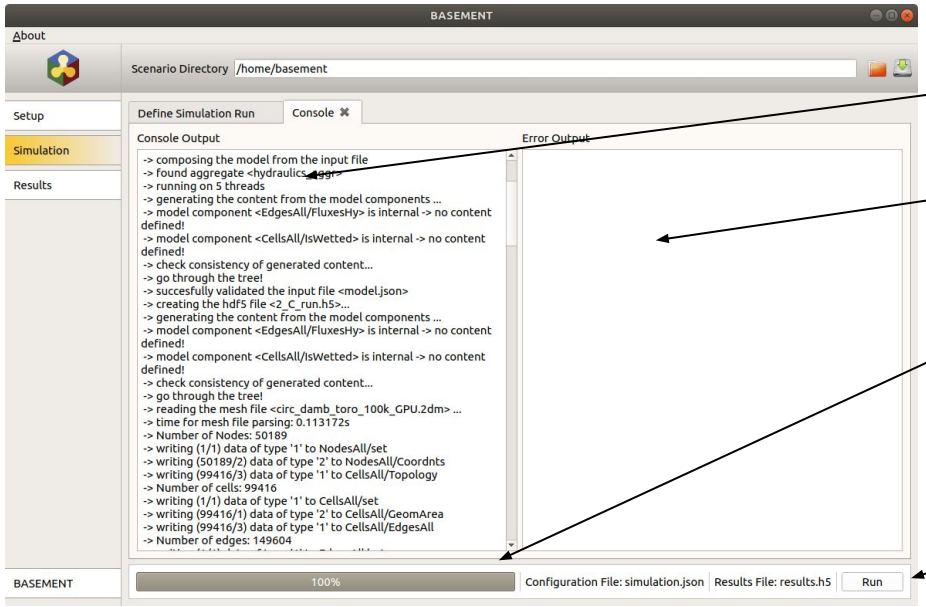
Parameter values

Errors and warnings



Run setup, simulation, and results

Run executables using the user interface.



Thank you

Questions?