Karlsruhe Institute of Technology

Tunka-Rex

SiMulation Manager v1.0

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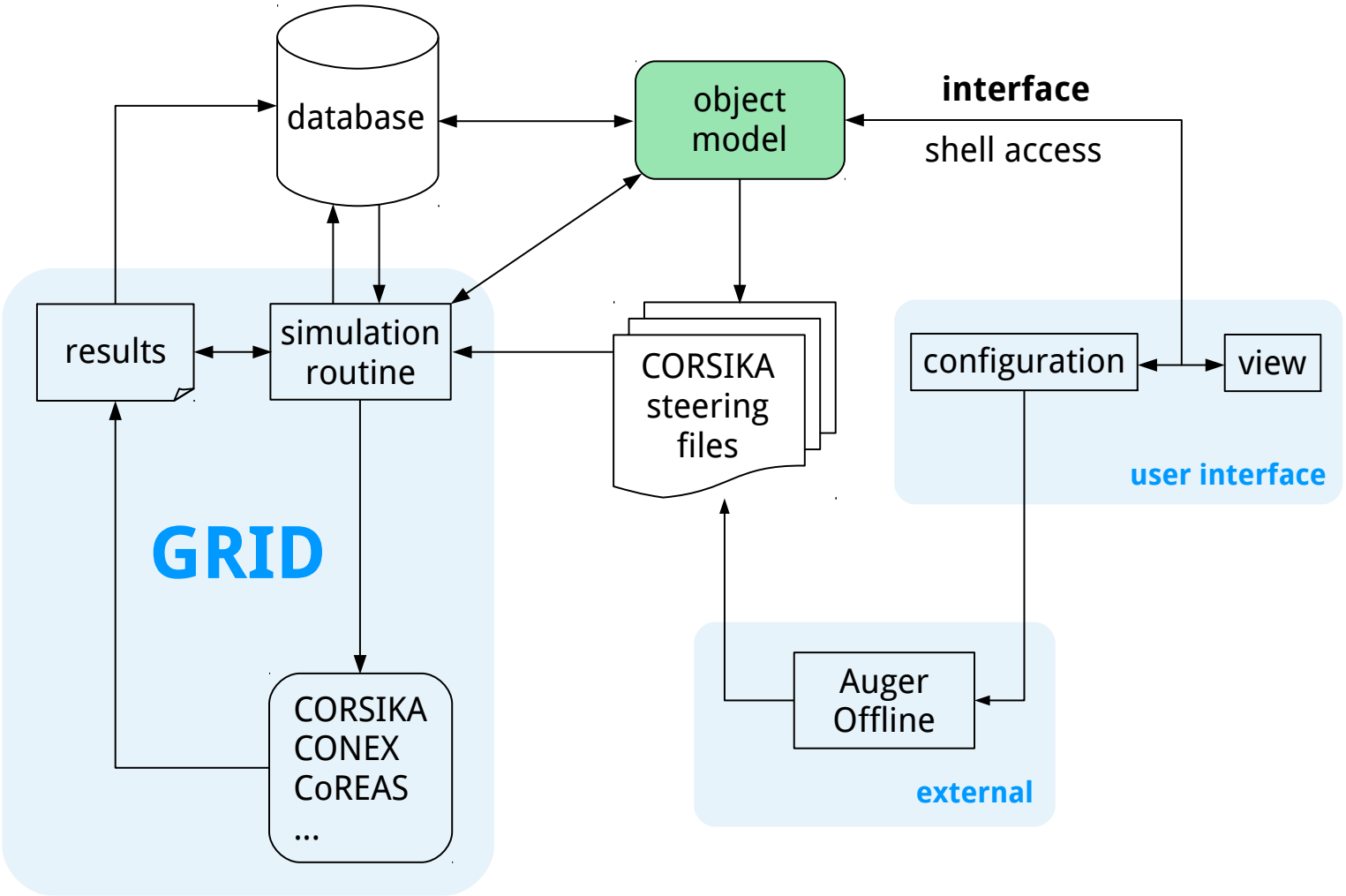
Motivation

- Abstact storage for reconstructed events with version control
- Possibility of the simple configuration/management for the simulations (≈ 200 simulations per event)
- Quick access to the data and ergonomic view of obtained results

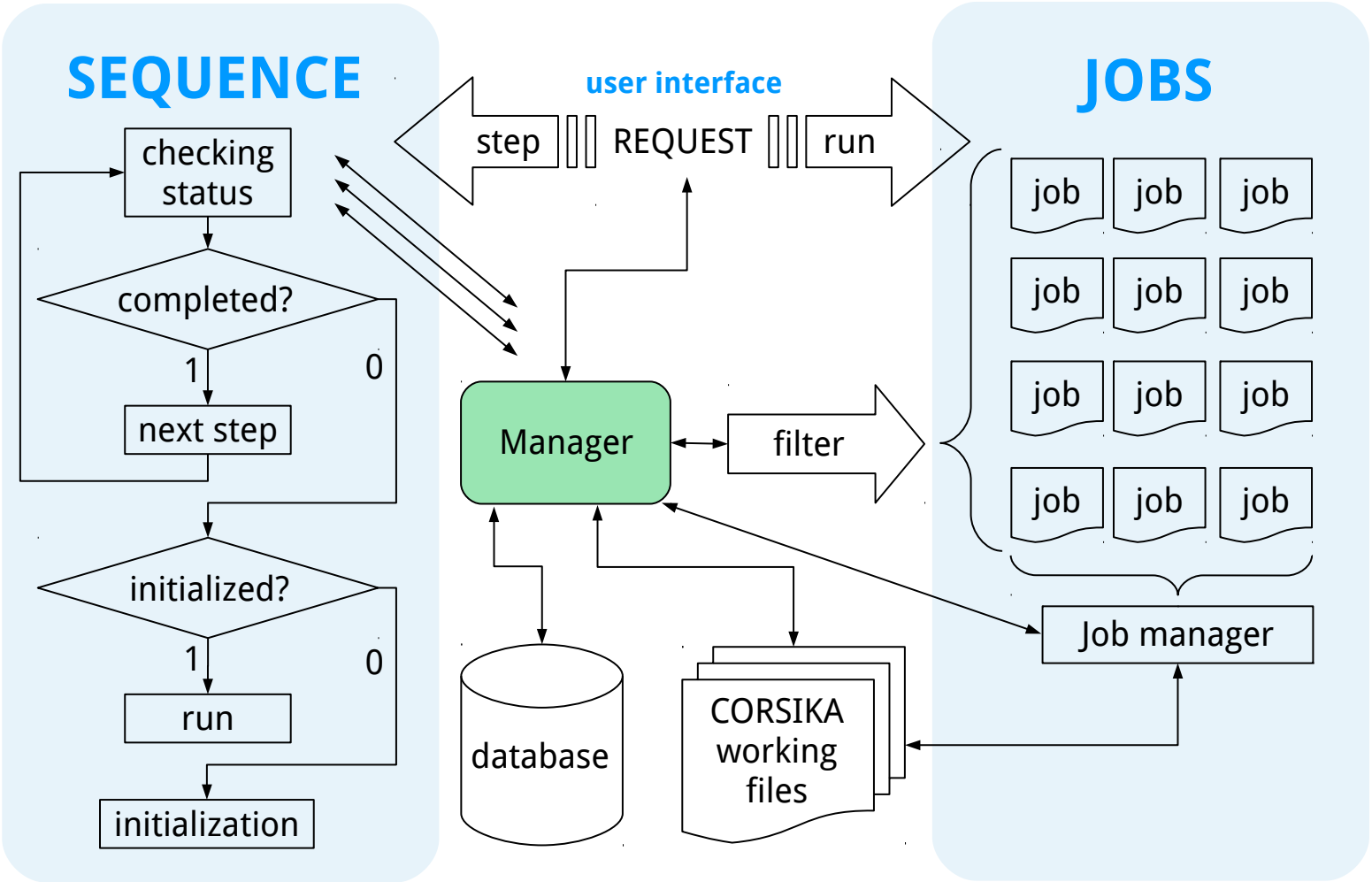
- Options for fine tuning
- Scaling
- Freedom from large overhead

First implementation was presented in 2013

Principal scheme



Object model



Example sequence

```
import core.Schema
from core.Schema import Step, Sequence, Simulation
from sqlalchemy.orm.session import make_transient
from Engine import DummyConexExample, \
                   DummyCoreasExample, \
                   DummyConfiguration, \
                   DummyInfoExample
import os

dirname, filename = os.path.split(os.path.abspath(__file__))
config = DummyConfiguration(dirname + "/config.rc")

Sequence = Sequence()
Sequence.name = "dummy"
Sequence.description = "This is dummy sequence"

def init(sequence) :
  sequence.add(DummyInfoExample)
  sequence.add(DummyConexExample)
  sequence.add(DummyCoreasExample)
  sequence.add_relation("conex")
  sequence.add_relation("coreas")
  sequence.config = config
```

Interface

```
[SIMM.core] Initialization
[SIMM.core] Loading config
[SIMM.Configuration] Reading
                       /path/to/simm/config.rc
                     Loading database
                     Loading simulation
                     Loading detector
                     Loading atmosphere
                     Loading offline
                     Loading backup
                     Loading misc
[SIMM.core] Connecting to database
[SIMM.core] Reading sequences
            Found 2 sequences
            Checking tunkaRex
            Checking dummy
[SIMM.MF(tunka)] Initialized with
                   T = 60.3181 uT; I = 71.7571; D = -2.7625
                   North = 18.8604038444 uT; East = -0.910054399618 uT;
                   Vertical = 57.2863871738 uT;
                   Horizontal = 18.8823471047 uT
[SIMM.core] Welcome to SIMulation Manager v1.0.0
[SIMM.core] Nothing to do
[SIMM.core] Bye!
```

Usage (step mode)

```
simm.py --sequence dummy --mode step
```

```
[SIMM.core] Using sequence dummy
[SIMM.dummy.DummyInfoExample] Sequence information
[SIMM.dummy.DummyInfoExample] Registered steps:
[SIMM.dummy.DummyInfoExample]   DummyInfoExample
[SIMM.dummy.DummyInfoExample]   DummyConexExample
[SIMM.dummy.DummyInfoExample]   DummyCoreasExample
[SIMM.dummy.DummyInfoExample] Registered relations:
[SIMM.dummy.DummyInfoExample]   conex
[SIMM.dummy.DummyInfoExample]   coreas
[SIMM.dummy.DummyInfoExample] Completed
[SIMM.dummy.DummyConexExample] Running
                               Making CONEX simulation
[SIMM.writer] File : /path/to/sim/data/123/RUN000123.inp
[SIMM.core] Bye!
```

Usage (run mode)

```
simm.py --sequence tunkaRex --mode run --id 123 -o dry
```

```
[SIMM.core] Found 1 simulations to run
[SIMM.core] Taking first. ID = 123
[SIMM.sim(554)] Starting run
[SIMM.sim(554)] CMD :
  export FLUPRO=/path/to/flupro/fluka-cluster ;
  cd /path/to/corsika/corsika-74000-cluster/run ;
  ./corsika74000Linux_QGSII_fluka_thin_curved_coreas < \
  /path/to/sim/data/123/RUN000123.inp 1> \
  /path/to/sim/data/123/RUN000123.log 2>> \
  /path/to/sim/data/123/RUN000123.err
[SIMM.sim(554)] Dry run! Exiting...
[SIMM.core] Bye!
```

Features

- Mathematical and physical transformations
- Writers for: `CORSIKA`, `CoREAS`, `Offline`
- `RdCoREASSimulationCreator` module for Radio Offline
- MySQL support
- Example sequences: Dummy, TunkaRex, MultiLayerDetector[1]
- Bash utilities: backup, repair, plotting, etc.

[1] was used to produce simulations for latest Tunka-Rex papers

Conclusion

Results

- $\sim$ 100k simulations were performed
- $\sim$ 3k were completed with full chain `CONEX` + `CoREAS` + `Offline`

Final steps

- Cleaning and commenting the code
- Documentation for example sequences
- Releasing
- User manual in `arxiv.org`