HiPAS GridLAB-D

Task 3 - Source Code Presentations

Topics covered

Multi-threading Iterators

Job control

Multi-threading Solvers

Stochastic Properties

Fast Data Access

Fast Powerflow Solvers

Online Documentation

General considerations

Upgrades to GridLAB-D core

- C/C++ code
  - Multi-threading
  - Stochastic variables
- Python module
  - Fast data access
  - Fast powerflow solver

Upgrades to external resources

- New subcommands
  - Job Control
- New online resources
  - Online documentation

Multi-threading

Multi-Threading Iterators (MTI)

- Convert code from C to C++
- Upgrade core entity/property loops
  - Schedules
  - Transforms
  - Loadshapes
  - Enduses
  - Randomvar
- Upgrade MTI module event loops
  - Init
  - Precommit
  - Sync
  - Commit
  - Term

Stochastic Variables

Correlated random variables

- Source random variable
- Correlation scale
- Correlation bias

Allow cascade of correlated variables

Avoids cholesky covariance decomposition

Properties of randomvar

- type:<distribution>(<parameters>)
- min/max:<bound>
- refresh:<rate>
- state:<seed>
- correlation:<obj.prop>*<scale>+<bias>
- integrate

Fast Data Access

Embedded python module

- "module <python> { <globals> … }"

Data accessors

- get(<category>)
- get_global(<name>)
- get_value(<object>,<name>)
- get_class(<name>)
- get_object(<object>)
- get_transform(<name>)
- get_property(<object>,<name>)
- set_global(<name>,<value>)
- set_value(<object>,<name>,<value>)

Other utility methods:

- title, version, copyright, credits, license
- output, debug, warning, error
- reset, command
- start, wait, cancel, pause, pauseat, resume
- module, add, load, save
- convert_unit, pstatus, add_callback

Fast Powerflow Solvers

Machine learning enhanced solver (solver_py)

- Hooked into NR solver

solver_python_solve()

- Calls ML solver before NR
- Suppresses NR solver on success

solver_python_learn()

- Called after NR
- Updates ML solver if NR succeeds

NR bus/branch data

- Copied to/from python memory
- Operations differ for solve/learn
- Solves include learned NR results

Topology change detection

- Topology hashes
- Include real value change sensitivity

Job Control

Job subcommand dispatches multiple runs

- CSV file guides runs
- Include global values/parameters
- Configuration (GLM globals, clock, etc.)
- Modify file (object property modifications)
- Work directory
- Thread count limit

Example job CSV:

	TEST1	TEST2	TEST3	TEST4
2	0	A	B	C
3	1	D	E	F
4	2	G	H	I
5	3	J	K	L
6	4	A	B	C
7	5	D	E	F

Online Documentation

SLAC GISMo Docs Browser

- Deployed at docs.gridlabd.us
- Support markdown format

Features

- Project/branch selections
- Button bar
- Mathjax
- Images and videos