# CyPhy2PET Design document

# Architecture

Generated files

TestBenchComponent.py

(JModelica/OModelica/Excel/SimpleCalculation)

Library files

load\_modelica\_mat.py

OM\_build.py

ToolSpecificCore.py

Write Parameters

Run

ParseResults

ToolSpecificCore.py

Write Parameters

Run

ParseResults

TestBenchComponent.py

(JModelica/OModelica/Excel/SimpleCalculation)

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PET Assembly.py

(DOE/Optimizer)

PET definition in the META tool

# Prerequisites

* Python 2.7
* OpenMDAO 0.2.2 (and all its dependency) installed at c:\openmdao-0.2.2 [\Scripts\python.exe]
* OpenModelica 1.8 %OPENMODELICAHOME% is defined.
* Pywin32 package (used for Excel)
* [elementtree](http://pypi.python.org/pypi/elementtree/) for PCC
* PCC runtime package and it has to be set in the registry HKEY\_CURRENT\_USER\Software\ISIS\META\PCCRoot
* 7-zip installed at c:\Program Files\7-Zip [\7z.exe]

# Assumptions

* Parameters/Metrics have unique names in each test benches
* In a PET container each element must have a unique name: Optimizer/Parameter Study/TestBenchRef
* PET must contain either an Optimizer or a Parameter Study (for DOE)
* PET must contain at least one TestBenchRef
* TestBenchRef-s could not be NULL
* Using only TestBenchRef-s, there should not be algebraic loops/circular dependencies Optimezier/Parameter Study element breaks the loop.
* All paths are turned into relative paths. E.g. Test bench’s URIs.
* TestBenchRefs, Optimizer/Parameter Study block and PET must have a python (class) compatible name and those cannot be name of the library files. (Without spaces/no python module/class keywords/etc).

# Parameter Study

## DOE

# Optimizer

NEWSUMPdriver

itmax=10

COBYLAdriver

rhobeg=1.0

rhoend=1.0e-4

maxfun=1000

SLSQPdriver

accuracy=1.0e-6

maxiter=50

Genetic

population\_size=90

crossover\_rate=0.9

mutation\_rate=0.02

selection\_method='rank'

# Test Bench type specific assumptions

## Simple Calculation

* Custom formulas cannot be connected in a chain.
* Each Custom Formula must have a unique name.

## Excel

## Dynamics Simulation

* Referred Test Bench must have a workflow definition, which contains exactly one of the following tasks:
  + CyPhyDynamicsInterpreter
  + CyPhy2Modelica: simulationTool = OModelica
  + CyPhy2Modelica: simulationTool = JModelica

## Mobility simulation

* Not supported

# TODO List

One design variable is connected to multiple parameters

self.driver.add\_parameter(('Paraboloid.x', 'Doubler.x'), low=-50., high=50.)

Constraint definition for optimizers

Add this one line between Objective and Design Variables:

self.driver.add\_constraint('Paraboloid.x-Paraboloid.y >= 15.0')

# CONMIN Flags

self.driver.iprint = 0

self.driver.itmax = 30

self.driver.fdch = .000001

self.driver.fdchm = .000001

# CONMIN Objective

self.driver.add\_objective('Paraboloid.f')

--> right here

# CONMIN Design Variables

self.driver.add\_parameter('Paraboloid.x', low=-50., high=50.)

self.driver.add\_parameter('Paraboloid.y', low=-50., high=50.)