Using Python Code Object To Keep Track of Mechanical Runs

Technical Support Case

#715582254

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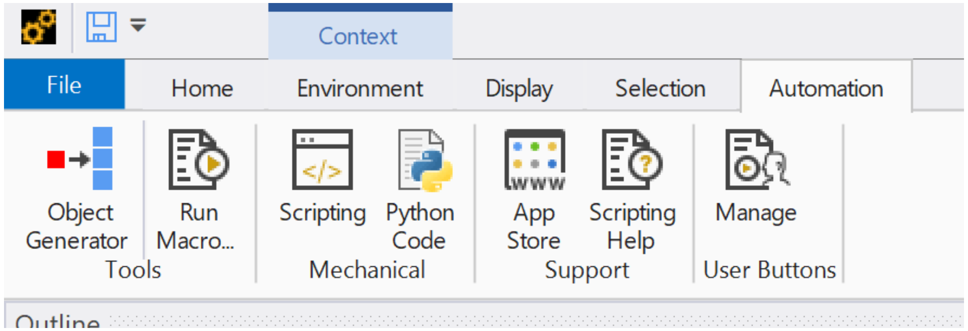
Objective

- We would like to achieve following:
  - Each design iteration has certain input/output parameter set
  - Want to capture this information for all design points, in a text file, in tabulated format
  - Want to have parameter definitions in the 1st column
  - Each design iteration would be an additional column in the table
  - The text file should be appended by new design iterations
- We achieve this goal, by using the “Python Code Object” in Ansys Mechanical

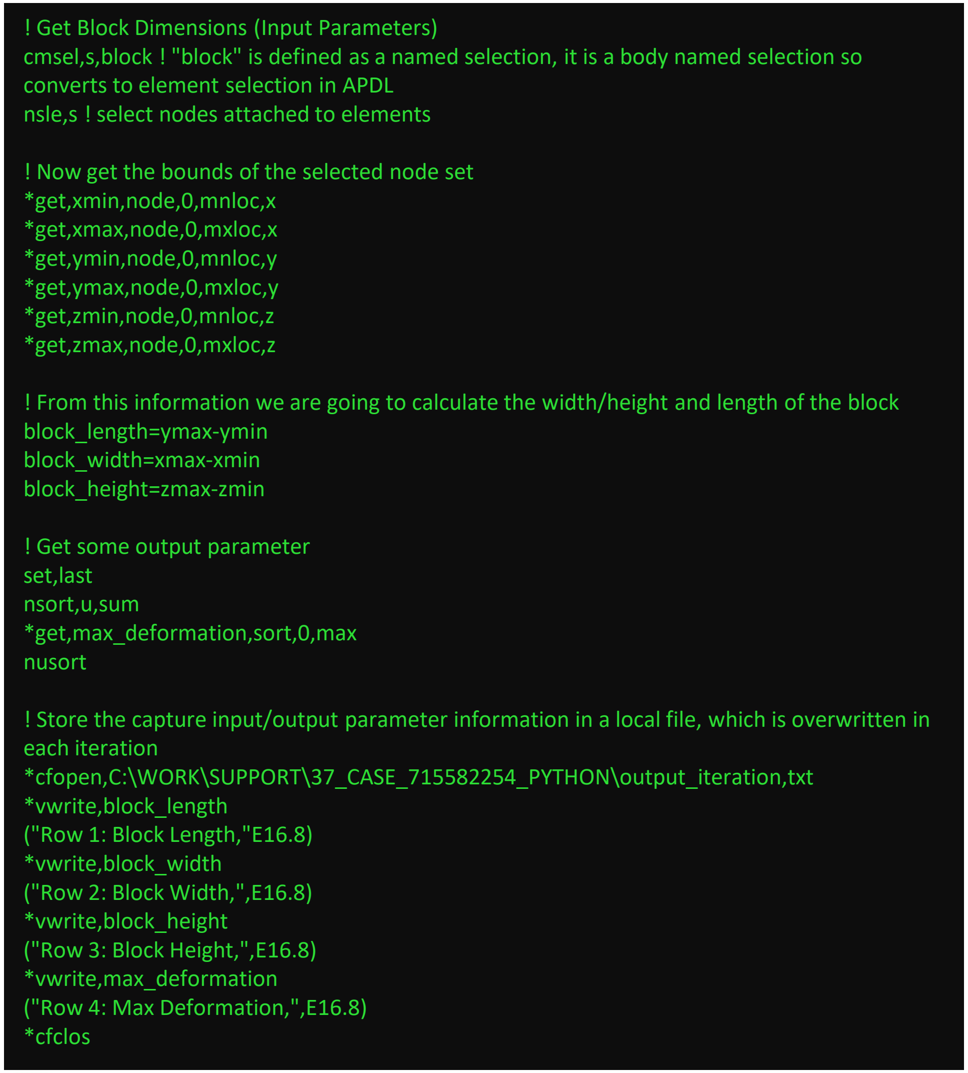
Python Code Object

- Located under “Automation Tab”
- Inserted based on selected item in project outline tree
- For our case this is under “Solution”, where post-processing takes place



APDL Post Processing Script

- APDL command snippet is used to extract some input parameters (length, width, height) and output parameters (maximum deformation at last frequency)
- These parameters are then written to a text file at a specific location
- Python script will consume this text file and append to a master file



```
! Get Block Dimensions (Input Parameters)
cmsel,s,block ! "block" is defined as a named selection, it is a body named selection so
converts to element selection in APDL
nsle,s ! select nodes attached to elements

! Now get the bounds of the selected node set
*get,xmin,node,0,mnloc,x
*get,xmax,node,0,mxloc,x
*get,ymin,node,0,mnloc,y
*get,ymax,node,0,mxloc,y
*get,zmin,node,0,mnloc,z
*get,zmax,node,0,mxloc,z

! From this information we are going to calculate the width/height and length of the block
block_length=ymax-ymin
block_width=xmax-xmin
block_height=zmax-zmin

! Get some output parameter
set,last
nsort,u,sum
*get,max_deformation,sort,0,max
nusort

! Store the capture input/output parameter information in a local file, which is overwritten in
each iteration
*cfopen,C:\WORK\SUPPORT\37_CASE_715582254_PYTHON\output_iteration,txt
*vwrite,block_length
("Row 1: Block Length,"E16.8)
*vwrite,block_width
("Row 2: Block Width,",E16.8)
*vwrite,block_height
("Row 3: Block Height,",E16.8)
*vwrite,max_deformation
("Row 4: Max Deformation,",E16.8)
*cfclos
```

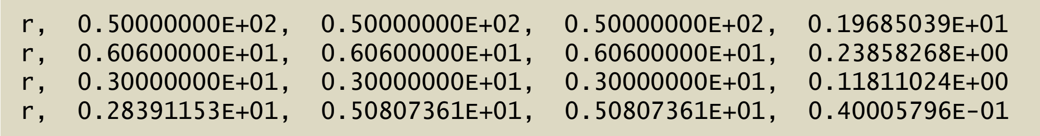
Python Code Object

- Python code object properties are set as follows:
  - Target Callback = “After Post”
- 3 things done in order
  - Text file written by APDL script is read in as “linesIn”
  - Master text file is read in as “linesInTable”
  - New design information (from “linesIn”) is appended to master file (“linesInTable”) and written out

```
def after_post(this, solution):# Do not edit this line
    from datetime import datetime
    workFolder=r"C:\WORK\SUPPORT\37_CASE_715582254_PYTHON"
    logFile = open(workFolder+r"\logFile.txt", "w")
    logFile.write(str(datetime.now()) + "[INFO] Process started1...\n")

# Read the text file written out by APDL script for single design iteration
    try:
        fIn = open(workFolder+r"\output_iteration.txt", "r")
        linesIn = fIn.readlines()
        fIn.close()
    except:
        pass

    # Read the summary table text file to be appended
    fInTable = open(workFolder+r"\design_iteration_summary_table.txt", "r")
    linesInTable = fInTable.readlines()
    fInTable.close()
    if len(linesInTable)  != 4:
        linesInTable = [
            "r1 \n",
            "r2 \n",
            "r3 \n",
            "r4 \n"
            ]

    fOut = open(workFolder+r"\design_iteration_summary_table.txt", "w")
    for i, line in enumerate(linesInTable):
        logFile.write(str(datetime.now()) + "[INFO] line number {0}\n".format(i+1))
        fOut.write(line[0:-1]+","+linesIn[i].split(",")[1][0:-1]+"\n")

    fOut.close()

    logFile.write(str(datetime.now()) + "[INFO] Process completed...\n")
    logFile.close()

pass
```

Final Output

- Final output includes a comma separated table with each column referring to a different design
- The first 3 rows are the input parameters and the final row is the output (maximum deformation)



```
r,  0.50000000E+02,  0.50000000E+02,  0.50000000E+02,  0.19685039E+01
r,  0.60600000E+01,  0.60600000E+01,  0.60600000E+01,  0.23858268E+00
r,  0.30000000E+01,  0.30000000E+01,  0.30000000E+01,  0.11811024E+00
r,  0.28391153E+01,  0.50807361E+01,  0.50807361E+01,  0.40005796E-01
```

Best Practices

- Python Code Object editor does not provide feedback about syntax or other types of code errors
- It is best to debug the code beforehand
  - Use any other python session but keep in mind that Ansys uses IronPython version 2
  - Use Ansys Mechanical scripting interface which provides interactive command window

END
Thank you for your attention

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