Content

1. Introduction & highlights
2. Flow
3. Homework
4. Operation
   1. Starting processes
   2. Set up the Evaluators
   3. Connect the Workbench Project to the DCS
   4. Watch the DPS at work
   5. Spaceclaim and Linux
   6. Debugging of solution
Why we need Distributed Compute Services?

After we manage to build up the a FE-model with parameters we have solve a lot of design points.
How can we solve it in a short time and use all type of resource?
We have computers with different
  • OS (Window/Linux)
  • Hardware (Number of CPUs/RAM)
  • Software (CAD)
  • Type (Workstations/Cluster/AWS)
We do not have administration right’s!
How can we get an overview about the status of the design points (pending/running/failed)?
How to keep the size of data small?
How to keep data traffic small?
Why we need Distributed Compute Services?

Old School solution:

We are the Job distributor!
Why we need Distributed Compute Services?

We are Job distributor!

- **Windows**
  - CAD
  - SCDM
  - 6 CPU
  - 265 GB RAM

- **Windows**
  - CAD
  - SCDM
  - 16 CPU
  - 196 GB RAM

- **Windows**
  - No CAD
  - SCDM
  - 4 CPU
  - 16 GB RAM

- **Windows**
  - CAD
  - SCDM
  - 6 CPU
  - 265 GB RAM (but not Version XX)

- **Linux**
  - No CAD
  - No SCDM
  - 20 CPU
  - 265 GB RAM

- **Linux**
  - No CAD
  - No SCDM
  - 20 CPU
  - 265 GB RAM

Yeah!! I using Remote Desktop solution. I don’t have to run any more!
Why we need Distributed Compute Services?

Using RSM:

A lot of Data Traffic!
Some times we get big Datafiles back, but we only need the output parameters!

You never walk alone!
Why we need Distributed Compute Services?

- We need a faster Network!

- We need more disk space!

- For the two next week we need more computers!

- Why my Design Point 86 is not running?

- We have to make an update on the computers and restart it!

- The next meeting is this week and not next week! We have to speed up the simulations!

- I don’t have administration rights!
Highlights

- **Data integrity**
  - Robust (no single point of failure)
  - Large number of Design Points (up to 10000, also less)

- **Distributed**
  - Supports a wide range of infrastructures
    - Desktop machines
    - Multiple desktop machines
    - Cluster with queueing system
    - Private/public cloud
    - Windows/Linux mixture with heterogeneous software installation
    - Pause update (release license for a while)

- **Extendable**
  - Connects to Design Point creating tools like (DX, optislang, …)
  - Python-Customizing (ANSYS 2020 R1)

- **Small network requirements (only output parameters, no rst file transferred)**

- **Configuration**
  - Web-based (Firefox/Chrome)
  - No administrative privileges required

For the two next week we need more computers!
OK. We can rent AWS or OTC machines.

The next meeting is this week and not next week!
We have to speed up the Simulations!
OK. We can rent AWS or OTC machines.
What is DCS/DPS/DCE?

- **DCS** (Distribute Compute Services) is a new family of services for evaluation and management of simulations.
- **DPS** (Design Point Service) is a subsystem to handle and solve hundreds to thousands of Design Points.
- **DCE** (Distribute Compute Evaluator) is the executing component.
„Im Rahmen meines Projekts mussten viele Varianten berechnet werden. DCS hat mir die Arbeit deutlich erleichtert. Die Konfiguration bleibt einfach, Varianten können dank der Evaluators auf mehrere Rechner verteilt werden. Die Design point Statistics geben eine klare Übersicht des Berechnungsverlaufs. Im Vergleich zum bisherigen Variantenberechnungsverfahren ist DCS stabil und erlaubte eine große Zeitersparnis. Diese Software habe ich in meiner Abteilung sofort empfohlen.“

Hr. Nicolas Kieffer – Schaeffler Automotive Buehl GmbH & Co. KG, Buehl
Evaluator on local workstation

Evaluators on remote workstations

Evaluator connecting to a Windows/Linux Cluster

Evaluator in Cloud

Picks an evaluator that suits concerning:
- cores
- tasks
- Capability (e.g. Spaceclaim, CAD)

Transfers project and input parameters

Transfers output parameters

Transfers project and input parameters

Transfers output parameters

I’m here and I can

Yes!!
This will reduce the utilization of our Network!

Great!
This will reduce the size of datafiles!

Can be all on one machine

Import input parameters

Export output parameters

Transfers project and input parameters

Evaluator in Cloud

Export output parameters
Homework

- Collect some information
  - Which and how many licenses are available?
  - Which machines are available?
  - How many cores per machine?
  - What is the size of the model?
  - Average solution time?
  - Operating systems?
  - Is solving quite robust?
ANSYS Distributed Compute Services

Starting processes
Starting processes

1. Start the **DPS**
2. Start the **DPE**

---

```
C:\Program Files\ANSYS Inc\v201\dcs\dclauncher.exe stop all
C:\Program Files\ANSYS Inc\v201\dcs\dclauncher.exe start server -W
C:\Program Files\ANSYS Inc\v201\dcs\dclauncher.exe start evaluator
```

Subprocess evaluator app is not running
Subprocess fsgateway is not running
Subprocess auth is not running
Subprocess dps is not running
Subprocess nginx is not running

Evaluator available at: https://127.0.0.1:444/dcs/evaluator
Subprocess nginx is already running
ANSYS Distributed Compute Services

Setup
Setup

• After the services are running you can setup the Design Point Services by a web browser (Chrome/Firefox)

• https://127.0.0.1:444/dcs/
Setup
Evaluator at local workstation

Evaluator: 
DCS Server: dcadmin@https://localhost:4444/fac/
DCS Server URL: https://localhost:4444/fac/
User Name: dcadmin
Password: dcadmin
Project Assignment: On Design Point Service

Logging:

© CADFEM 2020
ANSYS Distribute Compute Services
Setup
Evaluator at remote workstation

Just start the DCE on a other Computer and connect it to the DCS

Cool! I don’t need to be Admin.

If the evaluator is connected to the DCS I can define the Evaluator from my local Computer.
Available Evaluators for the DPS

- Manage the Evaluators from your Computer (number of CPUs, number of Tasks,…)
- Which Evaluator should be used for a Project or which should not be used at all.
- You can do it at any time!!

Ok. Now we can deactivate the Evaluator and make the update and restart the computer!
ANSYS Distributed Compute Services

Connect the Workbench Project to the DCS
Connect the Workbench Project to the DCS

Parameter Set
- Change to Submit to DPS
- Enter the URL of the DCS
- Enter a Name of the Project.
- Set the execution Time Limit
- Set up how many CPUs should be use by one Job.

DOE
- Define how many Design Points should be send to the DCS
Connect the Workbench Project to the DCS

- After press the update project Icon the project will be visible in the DPS
ANSYS Distributed Compute Services

Watch the DPS at work
Watch the DPS at work
Take a look to the Overview
Watch the DPS at work
Watch the DPS at work
Change the Status of a DP

• In this case the maximum execution Time was too short -> timeout
• Change the maximum execution Time and save the settings
• Select the DPs with the status timeout and change the Status to pending
Watch the DPS at work
Compare DPs
Watch the DPS at work

Start / Stop Project

• You can pause the Project and start it again at any time
ANSYS Distributed Compute Services

Spaceclaim and Linux
The Update of the DP will be split in two steps.

- Workbench Geometry
- Workbench Solution
Design Points with Spaceclaim and Linux

### Geometry update

- **STU-NK-18**: otc-ws-0036 (0.993245968273, 167115730.089)
- **STU-NK-18**: otc-ws-0036 (0.752436703248, 460276043.619)
- **STU-NK-18**: otc-ws-0036 (0.696608609848, 416537054.706)

### Solving

- **Evaluation Time**: 147 hours
- **Priority**: 0
- **Last Modified**: Jun 22, 2020, 5:07:24 PM
ANSYS Distributed Compute Services

Debugging of solution
Debugging of solution

For each DP there are is a LOG file of the Workbench Project available. In the File you can get information why the DP failed. (Geometry update / Meshing or solving)

The Model component in Static Structural requires user input before it can be updated. For instructions on how to address the cell in its current state, click the blue triangle in the lower right corner of the cell in the Project Schematic.

Oh, that is the reason why the Design Point 86 is not running
Debugging of solution

For each DP there is a LOG file of the Workbench Project available.

In the File you can get information why the DP failed. (Geometry update / Meshing or solving)

Element 4029 located in Body "Solid" (and maybe other elements) has become highly distorted.

The unconverged solution (identified as Substep 999999) is output for analysis debug purposes. Results at this time should not be used for any other purpose.

Oh, that is the reason why the Design Point 86 is not running? I just change the status of the DP and try it again.
Debugging of solution

Now I want to see the results of the Failed Design Point!!

Change the Task Directory Cleanup and change the status of the DP.
Now I can concentrate on my regular job. Being an engineer.
More Information

• CADFEM Support
  • support@cadfem.de
  • 08092 7005 55 (8:00 a.m. – 6 p.m)

• CADFEM Webinar
  • Please contact Mr. Kellermeyer mkellermeyer@cadfem.de and you get a one Week access to the CADFEM eLearning platform