

Assessment of PICO Next Phase Simulator for High-Resolution Models Simulation

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Agenda

- Introduction to PICO International
- Reservoir Simulation Challenges
- Proposed Solutions
- Solutions Assessment
- Conclusions

Introduction to PICO International

- Fields
- Production
- Activity
- Plan

Reservoir Simulation Challenges

PCIO fields have different geological and engineering challenges:

- High-resolution models (North Baharia Abrar , North Baharia Ganna)
- Complex and highly faulted geological structures (Amal Field)
- Stratigraphic reservoirs
- Water injection modeling in highly heterogeneous reservoirs

Proposed Solutions

- New parallel license as an extension of Eclipse
- INTERSECT as a new simulator including the parallel license
- Tnav as a new simulator including the parallel license



ECLIPSE



INTERSECT

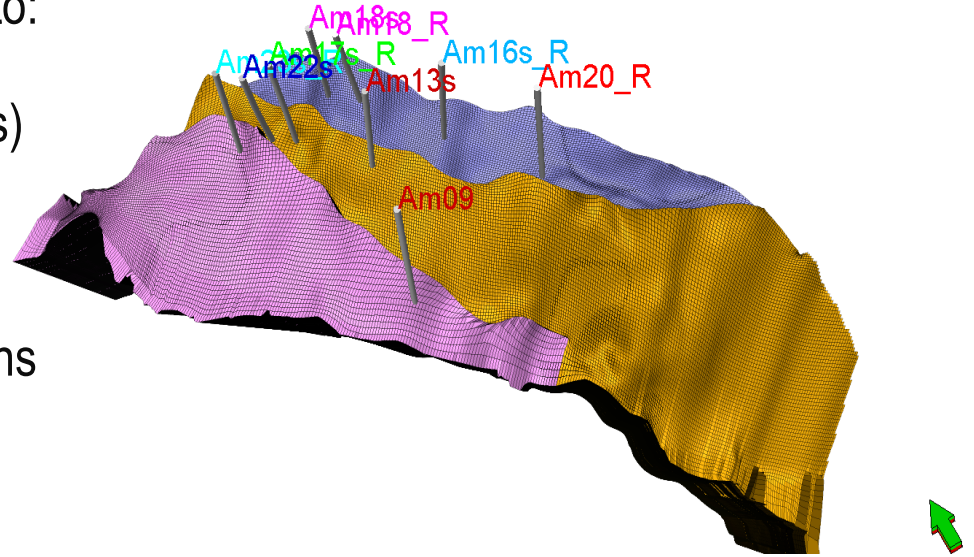


Solutions Assessment

Model Selection

Rudeis mode was selected for testing due to:

- Dimension: 94*362*435 (14.9 Million cells)
- Highly Faulted structure
- 2-PVT, 8-Equilibrium, 4 Saturation-Regions
- History Period (1989-2016)
- The running time on 12 threads workstation ~7hrs



Solutions Assessment

Comparison Criteria

- All the runs were made on the same machine to ensure integrity (HP z840 with 12 threads).
- All results are compared to Eclipse (Industry reference simulator)
- Comparison Criteria:
 1. The accuracy of the results
 2. Running time
 3. The technical support

Solutions Assessment Results

- RFD has to include selective tuning to accelerate the running time.
- Intersect showed the same results as ECLIPSE and decreased the running time by 80%
- Using INTERSECT parallel resulted in a significant improvement.

Simulator	Eclipse	RFD (without tuning)	RFD (1 CPU) Tuning	IX (1 CPU)
CPU time (Hrs.)	7	4.6	2.5	1.3
Accuracy	Reference Simulator	Pdiff= 10 psi Cum Gas Diff= 2.77 BCF	Same as Eclipse	Same as Eclipse
Comments			selective tuning	No tuning

Solutions Assessment

- INTERSECT was also tested on other models and showed the following results:
 - Abrar model running time improved by 90% using INTERSECT.
 - Ganna model running time improved by more than 90% using INTERSECT.
- INTERSECT was used to match the DST of West el Burllus model

Conclusions

- We agreed to purchase INTERSECT due to the following reasons:
 - IX managed to handle all PICO challenges
 - This has a significant impact on decision making and accuracy
 - Petrel Platform is the Interface for INTERRECT simulator
 - SLB technical support is a key advantage

Thank you for your attention