A Yokogawa Company

Update on CAPE-OPEN in KBC

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CAPE-OPEN Annual Meeting

12-13 October 2017

SUPERIOR RESULTS. **SUSTAINED**.

- CAPE-OPEN Support in KBC Software
- Some comments on CO developments

CAPE-OPEN Support in KBC Software

- ## Multiflash
  - CO Thermo 1.1 and 1.0 property Packages and Managers
  - Main applications - models not available elsewhere:
    - CPA; mercury; hydrates; wax precipitation; asphaltenes; PC-SAFT
  - 32 bit implementation has been widely used since public release in Multiflash 3.2 (2002)
  - 64 bit implementation since Multiflash 4.4 – although only used with CoCo as far as I am aware
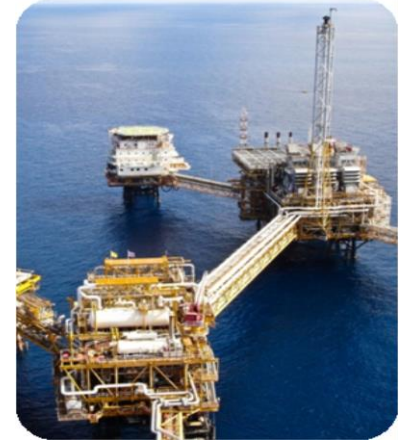
- ## Petro-SIM
  - 32 bit and 64 bit (since version 5.0) support for CO
  - Thermo 1.1 socket
  - Unit 1.0 socket
  - No support for Petro-SIM unit operations as CO plugs

KBC Software Developments
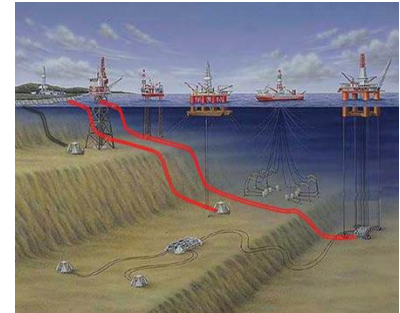
- Multiflash Version 6.2
  - Due for release in October
  - First public release including new threadsafe code
    - Flash procedures redesigned for use in multi-threaded environments
    - Includes principle models for oil and gas applications
  - Future versions will include threadsafe CO interface
- Petro-SIM 6.2
  - Released in August
  - New and improved reactor models
  - Integration
    - Maximus pipeline networks
    - Integrated process and utility modelling
    - Energy: Balancing steam networks; Combined heat and power

CO Thermo Developments

- Thermo 1.0
  - We support the proposal to deprecate version 1.0
  - No further CO-LaN effort on
    - Interoperability
    - Type Library support
    - Document clarification and updates
  - KBC will continue to support the Multiflash Thermo 1.0 COM interface for existing users
- Thermo 2.0
  - Focus on efficiency of implementation and ease of implementation
  - Aim to make CO Thermo as fast as a native implementation
  - New features
    - Derivatives of phase equilibrium calculations
    - Multiple calculations in single call
    - Support for parameter regression… ?
    - Critical points…?

COBIA

- Important development for the future of CAPE-OPEN
- Significant expectations and features for KBC
  - Improved performance
    - Support a Thermo interface with reduced communication overheads and faster execution time
    - Minimal COM-COBIA overhead
  - Simpler and more compact implementations
  - Platform independence
    - Not an immediate issue but may be in the future
    - Cloud computing?
- COBIA Thermo interface
  - We hope to implement and test a prototype COBIA Thermo interface with Multiflash
  - Thermo 1.0 support is not worthwhile

CO Self-Certification

- This is something we would welcome

- Need to define

  - Which CO components are included/eligible

  - Clear definition of what is required for each component

    - Functionality: e.g. which physical properties, derivatives…?

    - Interfaces supported: Identification, Utilities; Persistence…

    - Procedures for dealing with compliance failures

Other CO Developments

- Petroleum Fractions Interface
  - Essential to support refinery reactors – a key part KBC technology
  - Support 3rd party/proprietary reactor models in Petro-SIM
  - Prototype interface when specification is sufficiently defined
- Flowsheet Monitoring Proposal
  - PMC point of view: Multiflash could provide a means of checking for hydrate risk etc.
  - However, much of the functionality is already provided by Petro-SIM and probably by other PMEs
  - Complex and expensive to implement?
  - Would consider this for inclusion in the KBC software development roadmap

Other CO Developments

- Persistence Interface
  - Current position is confusing without clear guidelines for developers
  - COBIA based proposal is attractive
  - Does it depend on wide take-up of COBIA by PMC and PME vendors?
  - Interoperability with COM?
- Type Library installer
  - Currently not used in KBC
  - Multiflash: client's responsibility to install TLBs
- COLTT
  - We have not had the need to use this tool recently

Summary

- KBC supports CAPE-OPEN initiatives
  - We have been actively involved since 2002
  - CO support is part of the development roadmap

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