Interoperability tests and CAPE-OPEN Logging and Testing Tool (COLTT)

5th CAPE-OPEN European Conference
Cambridge 4th April 2008

Anaïs Cassajus and Michel Pons
Michel Pons Technologie for CO-LaN

Interoperability tests

A systematic action from CO-LaN

Anaïs Cassajus
Michel Pons Technologie for CO-LaN

Background

- Within development of PMCs and PMEs, unitary tests are necessary but not sufficient:
  - Need for integrated tests

- Integrated tests:
  - CAPE-OPEN Tester Suite
    - Systematic exercising of CAPE-OPEN methods
    - Needs maintenance (specification under review)
  - 3rd party PMCs and PMEs
    - Difficult to obtain / use by other commercial parties

Background

- Many CO-LaN Associate Members have awarded CO-LaN with licenses of their software products
  - For interoperability testing
  - For demonstration purposes
- Provides an opportunity for systematic testing of all possible combinations
  - Many combinations already tried in phase 2 of COLTT development

Available PMEs and PMCs

PME	Unit PMC	Thermo PMC
Aspen Plus	Xchanger Suite (HTRI)	MultiFlash
Aspen HYSYS	ChemSep	PPDS
PRO/II	AixCAPE ShortCut Toolbox	Aspen Properties
gPROMS	APECS (Fluent)	COM Thermo
UniSim Design	COUSCOUS UOs	UniSim Thermo
SolidSim	IFP/TOTAL PIPE	SIMULIS Thermodynamics
ChemCad	HYP/PFR	GERG (Bochum)
INDISS	gO:CAPE-OPEN UOs	CPA Property Package
COFE (COCO)		TEA (COCO)
ProSim Plus		VMGThermo
VALI		Cosmotherm
MFP2T (US EPA)		
SIMULIS Thermodynamics		

Interoperability tests

- More than 250 one-to-one combinations possible
- Several levels of testing defined
  - With thermodynamic components
    - Basic test (scenario 1)
      - Involves one material stream with a flash
    - Intermediate test (scenario 2)
      - Exercises with one UO most/all properties provided by PMC
    - Advanced test (scenario 3)
      - Exercises PMC in complete process model
  - With unit operation components
    - Basic test (scenario 1): single unit considered
    - Advanced test (scenario 2): within a process model

Interoperability tests

- **Documentation: a crucial deliverable**
  - Each test result and each issue raised have to be shared with parties involved
- **Major CO-LaN effort**
  - Costly in man-hours
  - CO-LaN has devoted 700 man-hours in 2008 for these tests from 1st January till 30th June

Where do we stand?

- 75 combinations already tested
  - 130 tests performed
    - Several scenarios and software versions
- 60 reports issued with log files made with COLTT

- Results obtained:
  - A number of implementation issues have been reported
  - Some have been formally considered as bugs by developers
  - Some have already been resolved

What lies ahead?

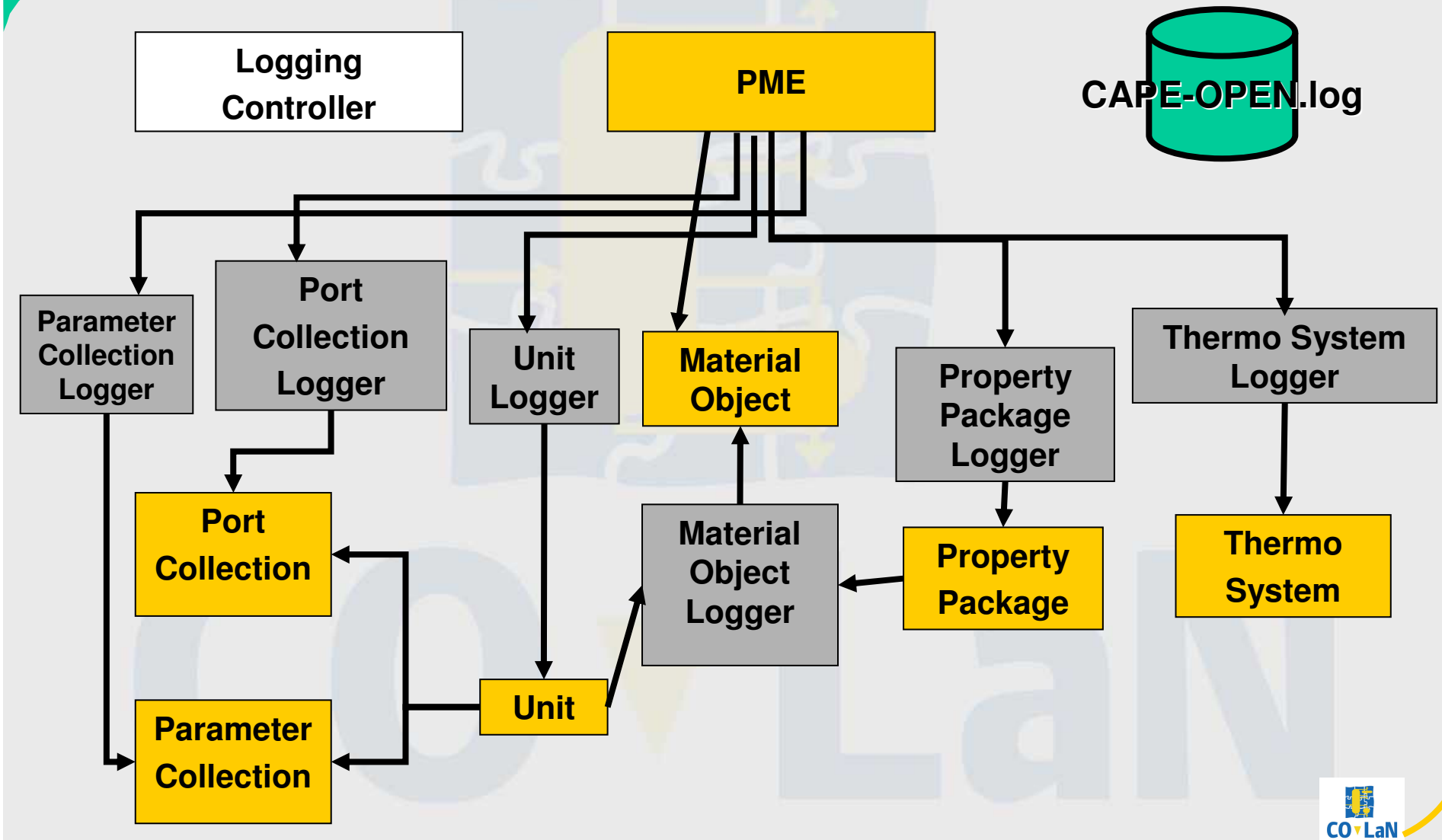
- 100+ combinations more till end of June 2008
- Testing process
  - Raises awareness on issues but does not resolve bugs
  - Needs support from parties behind software tested
- Is this an action to be sustained by CO-LaN together with interoperability support tools development?

CAPE-OPEN Logging and Testing Tool (COLTT)

A companion to the interoperability tests

Michel Pons
Michel Pons Technologie for CO-LaN

CAPE-OPEN Logger/Tester Communication



COLTT

COLTT development steps:

- **Phase 1 – concept development**
- **Phase 2 – systematic testing and analysis by SHMA & CTO**
- **Phase 3 – problem resolution**
- **Phase 4 – maintenance and extension**
  - **Started with production release on 8th March 2007**
  - **Maintenance contract in place with SHMA in Pakistan**

Scope

- **Logging controller**
  - Allows selection of logged PMCs
  - Sets required registry entries
  - Allows choice of destination for logging output
- **Loggers**
  - Partial but wide implementation
    - **Version 1.0**
      - Unit, Material Object, Property Package, Port, Collection, Thermo System, Calculation Routine, Simulation context, Error Handling, Parameter
    - **Version 1.1**
      - Property Package Manager, Property Package, Property Routine

Continuous maintenance process in place

- SHMA (Pakistan) contracted for maintenance
  - Issues found documented by CO-LaN
  - Debugging performed by SHMA on CO-LaN laptop
- SHMA contracted for COLTT extensions
  - Proprietary interface calls logging
  - Parameter logger
  - Thermo 1.1 loggers
- Michael Halloran contracted for
  - Audit of COLTT code
  - Evaluation of issues raised and of solution proposed

Versioning history

- March 8th 2007: version 1.0
- March 20th 2007: version 1.01
  - Installation bugs resolved
- April 6th 2007: version 1.02
- May 10th 2007: version 1.03
  - Several cases of debug assertion resolved
- July 12th 2007: version 1.04
  - Logging of 1.1 Thermo interfaces
- November 2nd 2007: version 1.05
  - Logging of calls to proprietary interfaces
- February 22nd 2008: version 1.06
  - ICapeParameter method calls logged

Progress within version 1.0 (1 year)

- **Usability**
  - Unique log file name
  - Real time logging available
- **CAPE-OPEN 1.0 and 1.1 coverage**
  - See previous slide
- **Audit performed by Michael Halloran**
  - Refactoring defined for reduced size of code and easier maintenance
  - Bugs / modifications listed (100+)

Perspectives

- Refactoring and listed modifications to proceed ASAP
- Basic tests incorporated in COLTT
  - Reporting on the spot implementation issues
- Easier management of output needed
  - Log output can be very large for somewhat complex simulations
  - Difficult to browse through flat files without structure
  - XML based structure considered

Thank you
Questions?