

Logging tools to help you

**Paper 444g - 6th CAPE-OPEN US Conference
Nashville, 11th November 2009**

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Steps to create a CAPE-OPEN PMC

- 1. Create a component implementing CO interfaces**
 - ⇒ **Wizards are available for Unit PMCs in Visual Basic, VB.Net, C++, FORTRAN 90 & Borland Delphi**
- 2. Check that the interfaces are correctly implemented**
 - ⇒ **Testers are available for Unit, Thermo, PPDB, SMST & MINLP PMCs**
- 3. Run the component with the target PME**
 - ⇒ **May work correctly but, if not, pinpointing the problem may be hard**
 - ⇒ **A logger helps by logging the communication between PMC and PME at runtime**



Loggers

- ◆ **A number of software development houses have made their own loggers:**
 - ⇒ **Ex: ProSim SA, Process Systems Enterprise, Infochem, TUV NEL Ltd**
 - ⇒ **Specific to a given tool**
- ◆ **Generic loggers**
 - ⇒ **OATS and COULIS from AmsterCHEM**
 - **Out-of-process pieces of software**
 - **Freeware: installed with COFE installation**
 - **Available from www.cocosimulator.org**
 - ⇒ **COLTT from CO-LaN**
 - **In-process software**
 - **Open source: available from <http://sourceforge.net/projects/cape-openlogin/>**



OATS - COULIS

- ◆ **To be used when testing a PMC – PME combination with a simulation model developed from almost scratch**
- ◆ **OATS logs thermodynamic components**
 - ⇒ **Cover 1.0 and 1.1 versions of Thermo spec**
- ◆ **COULIS logs unit operation components**
 - ⇒ **Need to be instantiated as a UO in process model**
- ◆ **Output is a XML file of extension olg**
 - ⇒ **Viewed with a parser provided by OATS**
 - ⇒ **Errors and warnings immediately highlighted**
 - ⇒ **Logs details: type, direction, value of each argument**

OATS-COULIS output

Log file MyPump230309a.olg:

File Search

- i** OATS Logging started at mars 23, 2009, 21:03
- i** Creating Unit Operation
- i** Object type: COULIS Logged Unit Operation
- IPersistStreamInit::InitNew (COULIS Logged Unit Operation)
- i** Pump: QueryInterface for unsupported interface {1C733A30-2A1C-11CE-ADE5-00AA0044773D} results E_NOINTERFACE
- ICapeUtilities::Initialize (Pump)
- ICapeUtilities::put_simulationContext (Pump)
 - context (type: interface)
 - !** Object does not implement ICapeIdentification
 - ←** ICapeCOSEUtilities::get_NamedValueList (<unknown>)
- i** Pump: QueryInterface for unsupported interface {1C733A30-2A1C-11CE-ADE5-00AA0044773D} results E_NOINTERFACE
- ICapeUnit::Validate (Pump)
- ICapeUtilities::get_parameters (Pump)
 - parameters (type: interface)
 - NULL
- i** Parameter Collection: QueryInterface for unsupported interface IMarshal results E_NOINTERFACE
- i** Parameter Collection: QueryInterface for unsupported interface IMarshal results E_NOINTERFACE
- i** Parameter Collection: QueryInterface for unsupported interface {0000001B-0000-0000-C000-000000000046} results E_NOINTERFACE
- i** Parameter Collection: QueryInterface for unsupported interface IStdMarshalInfo results E_NOINTERFACE
- i** Parameter Collection: QueryInterface for unsupported interface IExternalConnection results E_NOINTERFACE
- i** Parameter Collection: QueryInterface for unsupported interface {4C1E39E1-E3E3-4296-AA86-EC938D896E92} results E_NOINTERFACE
- i** Parameter Collection: QueryInterface for unsupported interface {1C733A30-2A1C-11CE-ADE5-00AA0044773D} results E_NOINTERFACE
- ICapeCollection::Count (Parameter Collection)
- ICapeUtilities::get_parameters (Pump)

Errors

- !** Object does not implement ICapeIdentification

Each green arrow is a CAPE-OPEN method call

Each method call may be developed further

Non-CAPE-OPEN method calls appear as info

COLTT

- ◆ To be used for logging an existing simulation model involving PMCs or one developed from scratch
- ◆ Part 1: Logging controller
 - ⇒ Allows selection of logged PMCs
 - ⇒ Allows choice of destination for logging output
 - ⇒ Allows real-time view of log
- ◆ Part 2: Loggers (cover CO standards 1.0 and 1.1)
 - ⇒ Implementation of loggers for
 - Unit, Material Object, Property Package, Port, Collection, Thermo System, Property Package Manager, Property Routine, Simulation context, Error handling, Parameter
- ◆ Output is a text file to be viewed in NotePad like tools



COLTT developed in 5 phases

- ◆ **Phase 1 – concept development**
 - ⇒ No coding changes needed by user?
 - ⇒ No interference with the PMC or PME?
- ◆ **Phase 2 – systematic testing and analysis**
 - ⇒ SHMA & CTO
- ◆ **Phase 3 – problem resolution**
 - ⇒ Solutions developed by SHMA (v1.0 on March 7, Y07)
- ◆ **Phase 4 – enhancing scope**
 - ⇒ Thermo version 1.1 / Error handling / etc...
- ◆ **Phase 5 – refactoring for better maintainability**
 - ⇒ Following audit by Michael Halloran

Suggested workflow

- ◆ **Install COLTT on your machine (MSI file provided)**
 - ⇒ **Current version is 1.08.4**
 - ⇒ **Launch from Start\Programs\CAPE-OPEN**
- ◆ **Define logging output (file) within Logging Controller**
 - ⇒ **Default in Application Data\COLTT with PME name and date in log file name**
- ◆ **Enable logging on PMC(s) via Logging controller**
 - ⇒ **PMCs arranged per type (PPM, UO, PP, etc...)**
- ◆ **Run the simulation between PME and PMC(s)**
- ◆ **Disable logging on PMC(s) via Logging Controller**
- ◆ **Analyze log**

Example of use of loggers (1)

- ◆ Run of a given PMC in a given PME. Calculation is mentioned as incomplete. No other indication. What happened?
- ◆ Enabling COLTT on UO (PMC) and examining the log obtained
- ◆ UO sets a MO to a composition with only water:

MaterialObject <\$S99> : Call to SetProp :

Property	Phase---	Basis---	Calc----	Compounds	New values
fraction	liquid	mole	(null)	METHANE	0.000000000
				ETHANE	0.000000000
				PROPANE	0.000000000
				BUTANE	0.000000000
				PENTANE	0.000000000
				DECANE	0.000000000
				H2O	1.000000000

MaterialObject <\$S29> : Return from SetProp - Succeeded



Example of use of loggers (2)

- ◆ Then the UO calls for a density calculation on the liquid phase of this Material Object:

MaterialObject <\$S99> : Call to CalcProp requesting:

Property	Phase---	Calc----	Compounds
density	liquid	mixture	METHANE
			ETHANE
			PROPANE
			BUTANE
			IBUTANE
			PENTANE
			IPENTANE
			DECANE
			H2O

Return from CalcProp with CAPE-OPEN error:

Error Name : ECapeUnknownHR



Example of use of loggers (3)

Error Name : ECapeUnknownHR

Error Code : 0x80040501

Object Name : Anonymous

Interface : ICapeThermoMaterialObject

Method : CalcProp

Description : Unknown error while calculating property
"DENSITY".

The property call fails. Problem is on PME side which no longer treats water as a separate phase.

Logging tools to help you

Make use of loggers as much as possible

Contribute to COLTT development if possible

URL <http://sourceforge.net/apps/trac/cape-openloggin/report/1>

Thank you!

