



Managing Polling Adaptability in a CIM/WBEM

Infrastructure

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Synthesis

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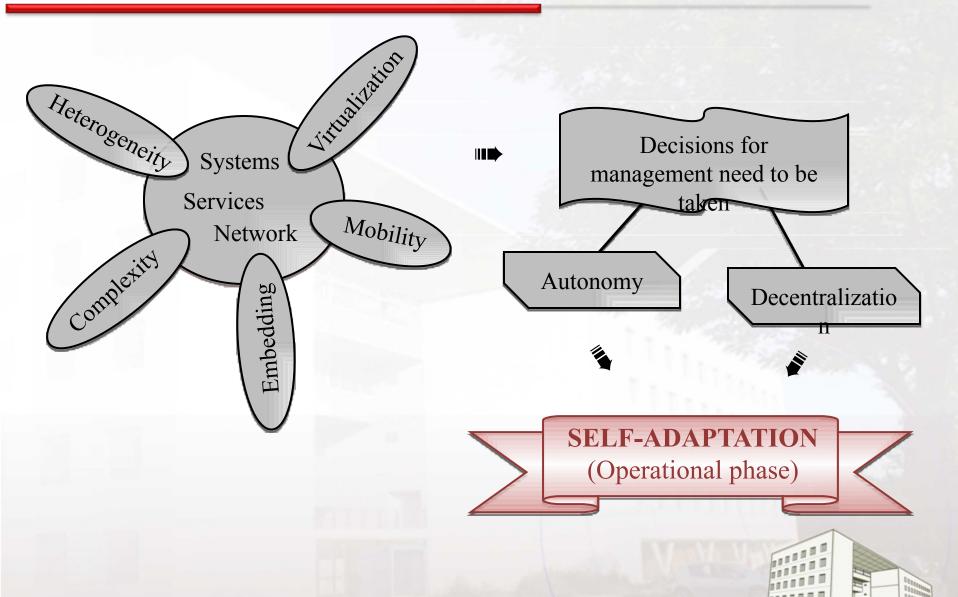
Introduction

- General Context
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Introduction • Polling Adaptability Alignment with DMTF

Experimentation Synthesis

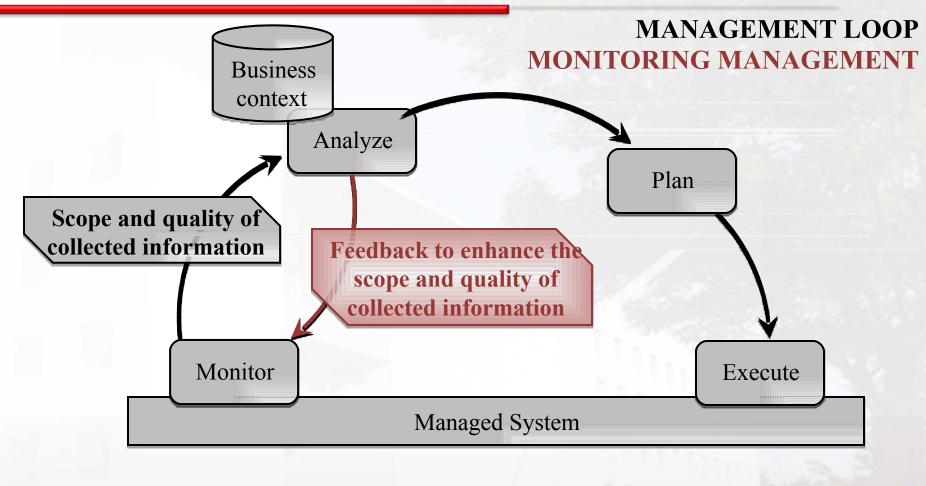
GENERAL CONTEXT



Introduction • Polling Adaptability Alignment with DMTF

Experimentation Synthesis

THE MONITORING IN THE MANAGEMENT LOOP



HOW TO MAKE MORE FLEXIBLE AND ADAPTABLE THE MONITORING

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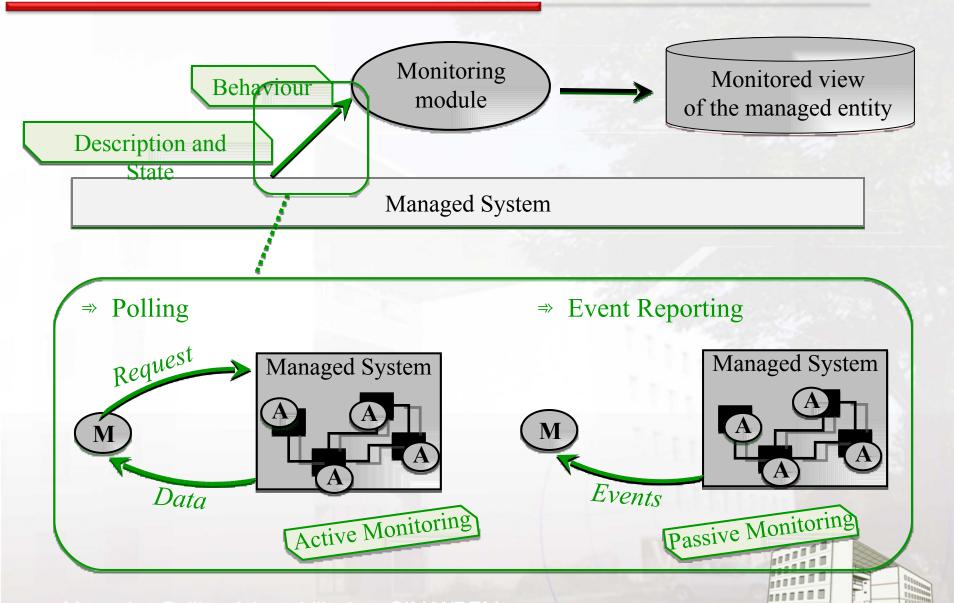


Characterization of Polling Adaptability

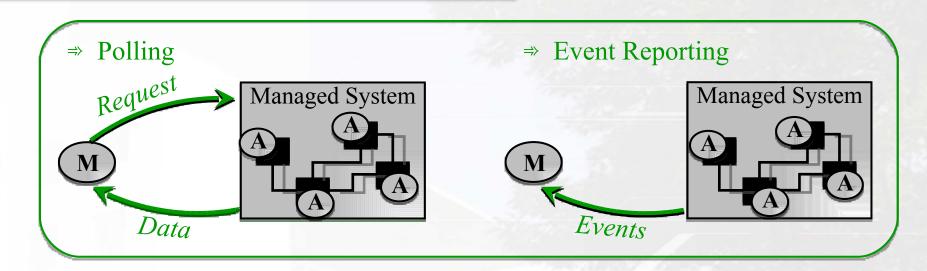
- Monitoring Characterization
- Polling Configurability
- Dolling Adaptability

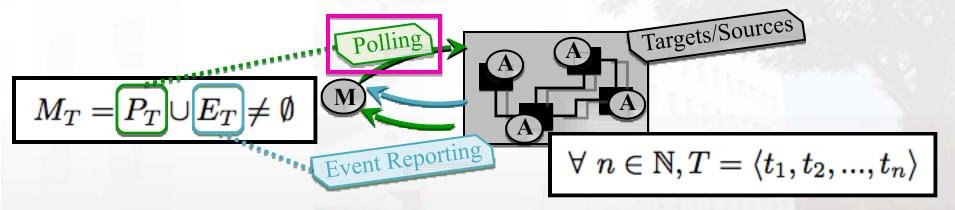


THE MONITORING ACTIVITY



MONITORING CHARACTERIZATION

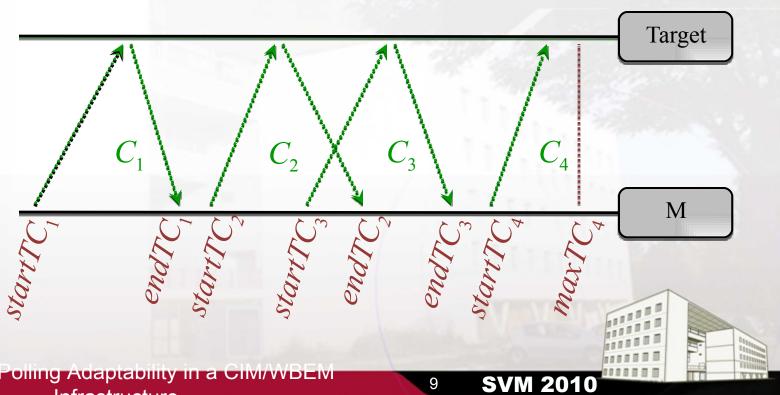




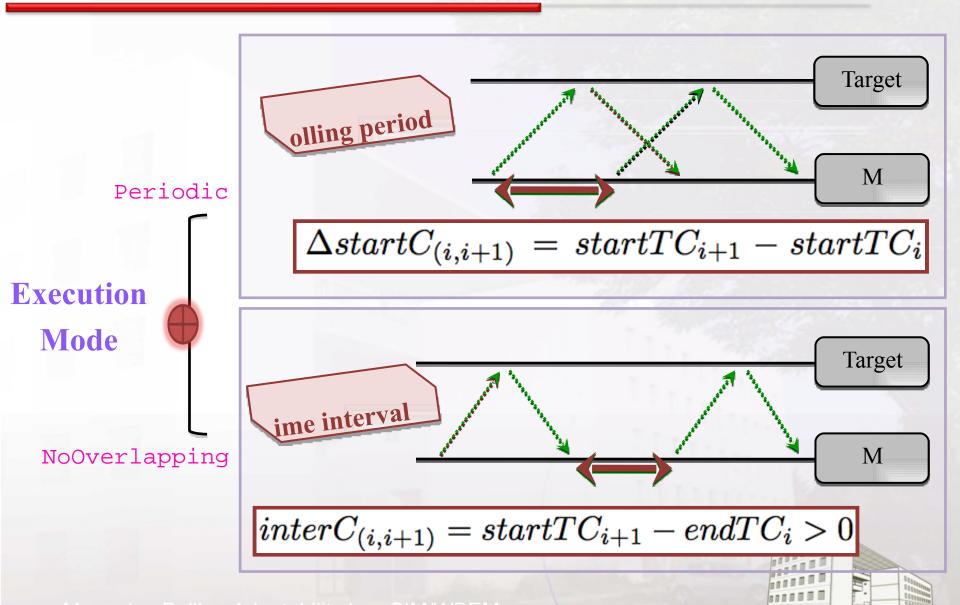
$$C_f = \{inst\left(Pa_{mdf}\right)\} \cup \{inst\left(Pa_{\neg mdf}\right)\}$$

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$$\forall \ i \in \mathbb{N}, P_T = \langle C_1, C_2, ..., C_i \rangle$$
 such that $\forall \ i, startTC_i < startTC_{i+1}$



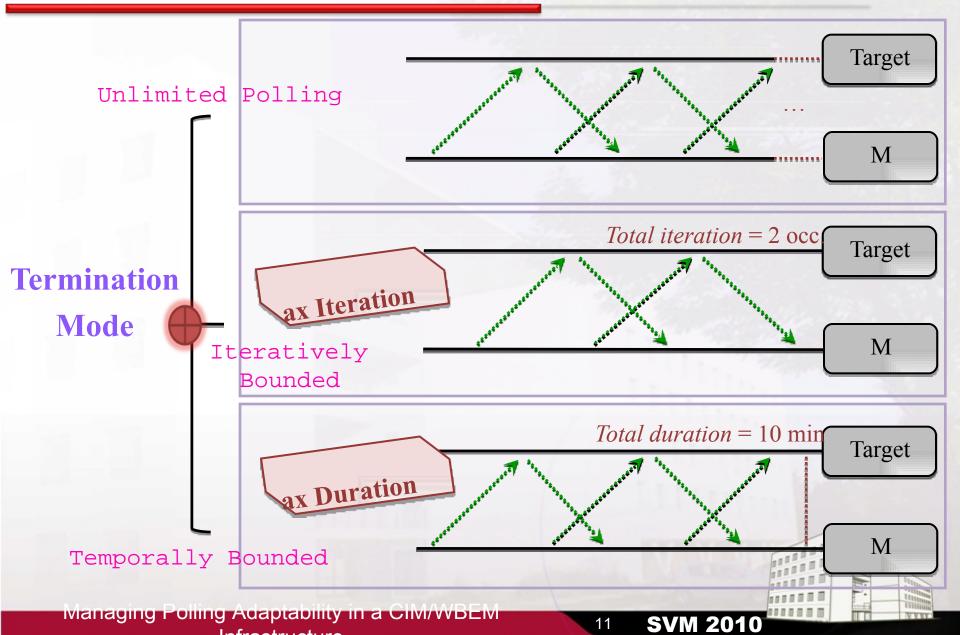
1ST PARAMETER: EXECUTION MODE



Introduction • Polling Adaptability • Alignment with DMTF Experimentation Synthesis

2ND PARAMETER: TERMINATION MODE

Infrastructure

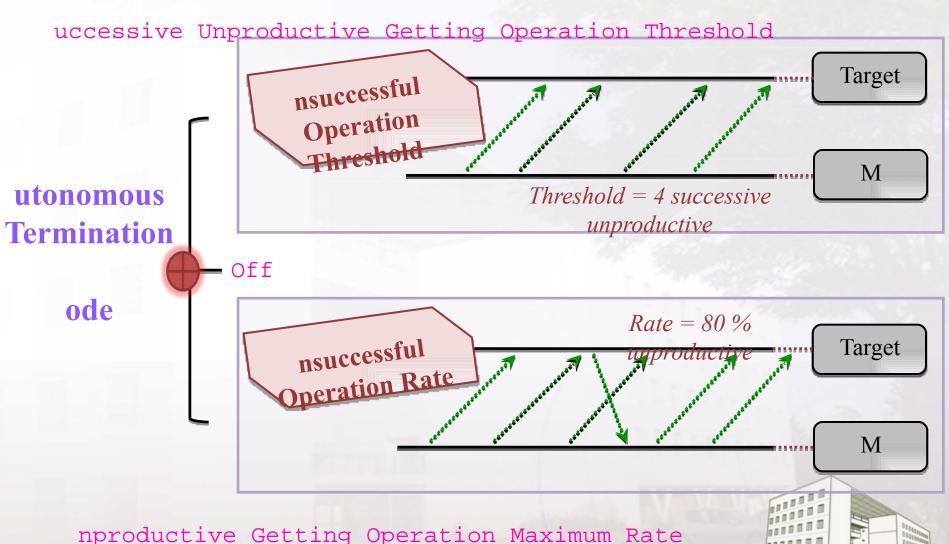


Introduction Polling Adaptability Alignment with DMTF Experimentation 3RD PARAMETER: WAITING TIME AND DDODUCTIVITY Target Productive Request esponse waiting M delay MaxTCaiting Time and $MaxTC_{i}$ Target esponse waiting delay roductivity Unproductive Requests M Target $MaxTC_{i}$ Target M $MaxTC_{i}$ M

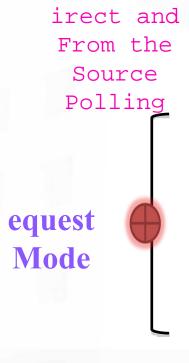
Introduction • Polling Adaptability • Alignment with DMTF Experimentation

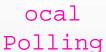
4TH PARAMETER: AUTOSynthesisus

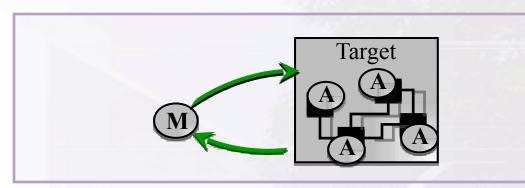
TERMINATION MODE



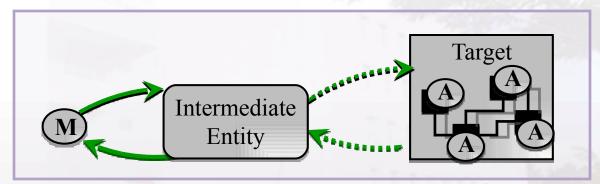
5TH PARAMETER: REQUEST MODE







Synthesis



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POLLING CONFIGURABILITY: PARAMETERS

Selector parameters (Types enum)			
Label	Value	M	
Execution	Periodic		
mode	NoOverlapping		
Termination mode	Unlimited		
	Iterative	×	
	Temporal		
Autonomous	Off		
termination	ThresholdSuccImp	×	
mode	RateImp		
Paguast	Source	X	
Request mode	Local	*	

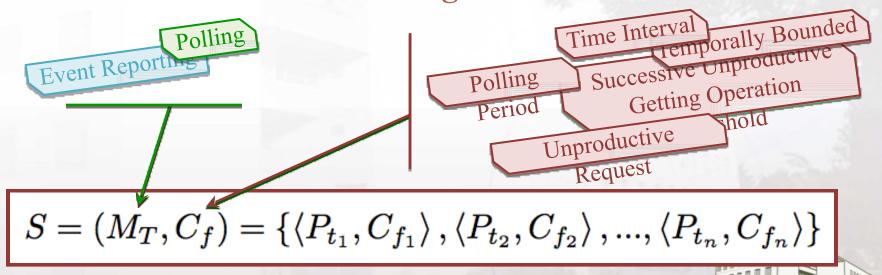
Other parameters			
Other parameters			
Label	Type	M	
Answer delay	ulong		
Polling period	ulong		
Request delay	ulong	1	
Maximal number	ulong	√	
Total duration	ulong	1	
Succ. unprod. op.	ushort	√	
Unprod. op. max. rate	float	1	

POLLING ADAPTABILITY EXPRESSION

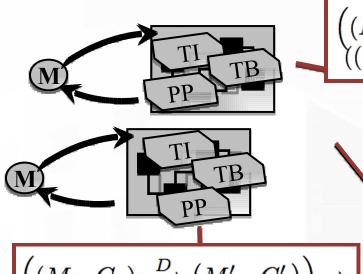
 Adaptability occurs when at least one parameter changes: the monitoring state turns into another state

$$\delta_S = S \to S'$$

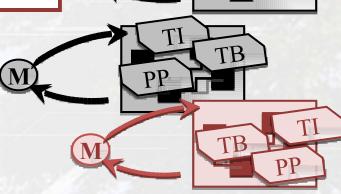
 A monitoring strategy is the association between the mechanisms and their configurations



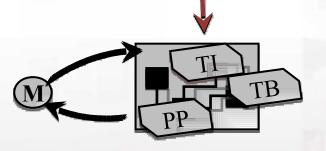
POLLING ADAPTABILITY

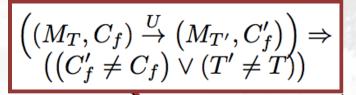


$$\begin{pmatrix}
(M_T, C_f) & \xrightarrow{A} (M'_{T'}, C'_f) \\
((|M'_{T'}| > |M_T|) \land (T' \supseteq T))
\end{pmatrix} \Rightarrow$$



$$\begin{pmatrix} (M_T, C_f) \xrightarrow{D} (M'_{T'}, C'_f) \end{pmatrix} \Rightarrow \\ ((|M'_{T'}| < |M_T|) \land (T' \subseteq T))$$

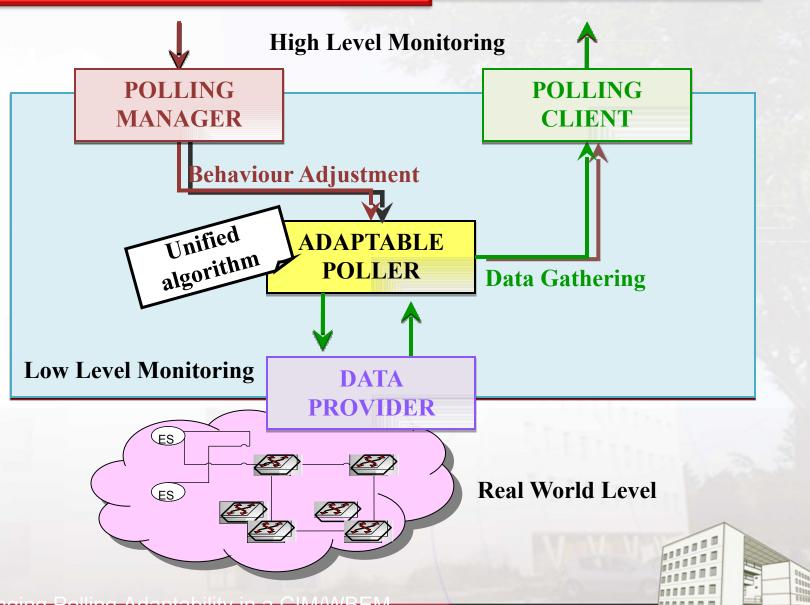




TI = Time Interval IB = Iteratively Bounded PP = Polling Period TB = Temporally Bounded M TI IB PP

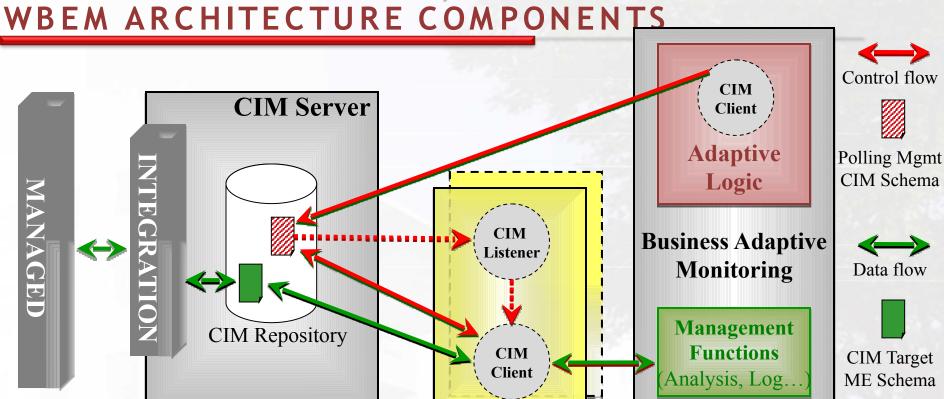
Managing Polling Adaptability in a CliM/WBEM

THE ROLES



Alignment with DMTF Standards

- WBEM Architecture Components
- © CIM Information Model



Adaptable Poller(s)

- Generic approach
 - All possible polling configuration
 - Independence of all management protocols
- Uniformity of both the modeling and the formalization through the CIM Schema

Managing Polling Adaptability in a CIM/WBEM Infrastructure

Introduction Polling Adaptability Alignment with DMTF Experimentation | Synthesis CIM INFORMATION MODEL ManagedElement (See Core Model) *ManagedSystemEle* (See Corm Model) **Collection** (See Core Model) LogicalElement (See Core Model) **CollectionOfMSEs** (See Core Model) **EnabledLogicalEle** (See Corm Model) CollectionOfPollingT arget Service CreationClassName: string IndividualPollingTarg {key} PropertyLigg: string StartService(): uint32 **MonitoringService** StopService(): uint32 **CollectionPollingTarg** PropertyList: string[**PollingOperation PollingGroup PollingOperations** ExecutionMode: uint16 {enum} PollPeriod: uint16 RequestDelay: uint16 TimeWaitReply: uint16 RequestMode: uint16 {enum} StopMode: uint16 {enum} MaxIteration: uint32 TemporalValue: uint32 UnsuccessfulOperationThreshold: uint16 UnsuccessfulOperationRate: real32 Ivianaging Polling Adaptability in a Cilvi/WBEW **SVM 2010** 21 Infrastructure

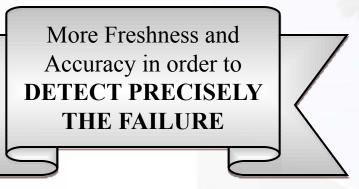
Experimentation with Open Pegasus

- 2 Scenario
- UML Interaction Diagram



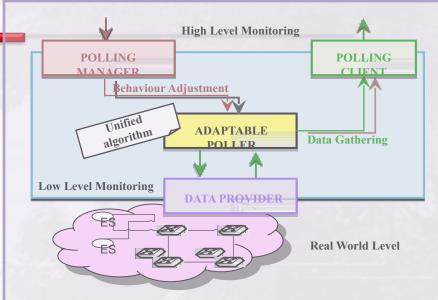
Synthesis

SCENARIO



ADAPTABLE POLLER

Polling Period ← 60 sec Rely on refreshed data (SNMP agent)



Subscription in order to receive **FAULT INDICATIONS** (private protocol)

if event = FAULT INDICATION then Reduce the *Polling Period* end if

Introduction Polling Adaptability Alignment with DMTF Experimentation Synthesis UML INTERACTION DIAGRAM **Adaptive Monitor** AdaptablePoller CIM Listener **Legacy Protocol SNMP CIM Server** (CIM Listener Legacy CIM PollingOperation **Notification Operation OpenPegasus** Protocol Indication & Client InstanceModify **ObjectProvider ObjectProvide CIMOM** CIM Client Polling Manager Polling par PollingLoop (controlParameters) getRefreshed(target) OPRefresh(target) getSNMP(oid) value Get(target) value Notification IndicationCreate(source) IndicationNotify(source) Modify(PollingOperation.PollPeriod, newPeriod) InstanceModificationIndication Get(PollingOperation) InternalSignal Minimal effort for development value UpdatePollingControl(Loop.controlParameters) Overhead measure: 3 to 4ms Ivianaging Polling Adaptability in a Clivi/VVBEIVI **SVM 2010** 24 Infrastructure

Synthesis and Future Work

- Synthesis
- Future Work

SYNTHESIS AND FUTURE WORK

Synthesis

- Services oriented vision of the **monitoring** concept
- Formalization of the polling configurability and adaptability
- **CIM** information model and **WBEM** architecture components
- **Experimentation** with Open Pegasus

Future Work

- Extend the control capability of polling services
- Refine the formal representation of the polling mechanism
- Enlarge control capability to the event reporting mechanism
- ⇒ Finally, a study is in progress to **define a language** for the control capability with the use of business monitoring strategies

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