# Design of Self-Adaptive Monitoring Systems Ensuring Quality of Measurements: A Novel Approach

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University Toulouse III - IRIT (Institut de Recherche en Informatique de Toulouse)

October 14, 2013

# Agenda

# Introduction

# Context

Systems are conceived based on:

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- Non-Functional Requirements (NFR):

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Usually, QoS-Oriented Systems are built as Autonomous Systems implemting the MAPE Loop (Monitoring, Analyzing, Planning, Executing).

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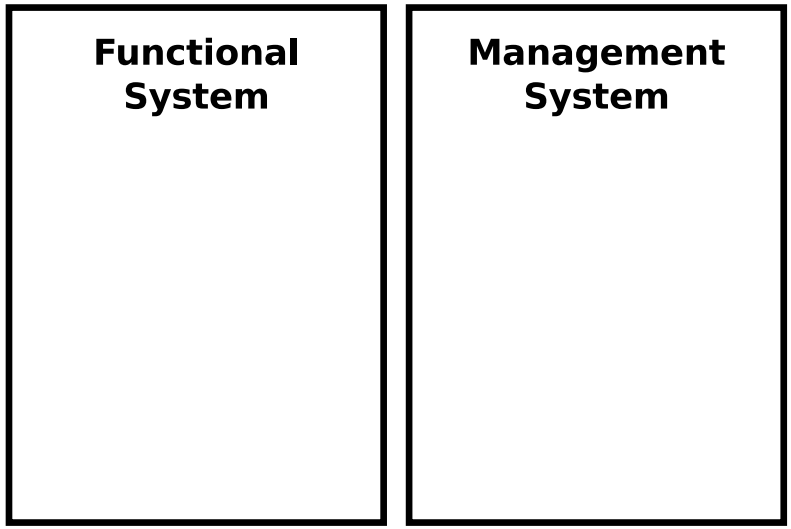

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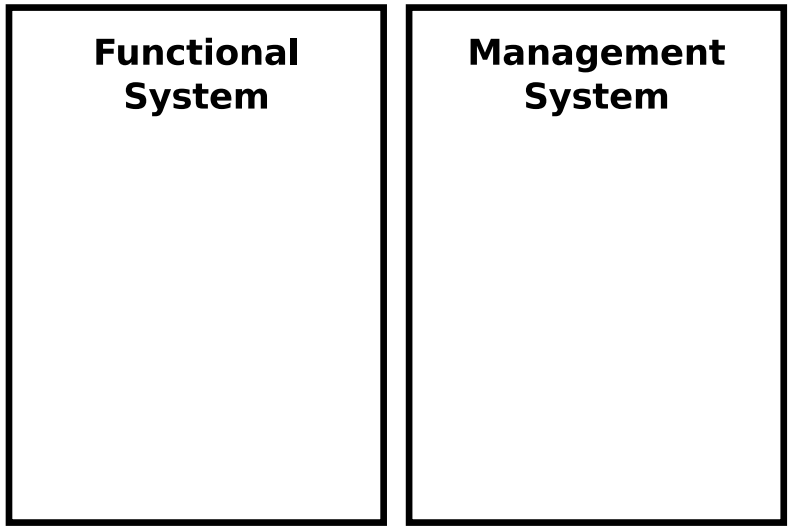

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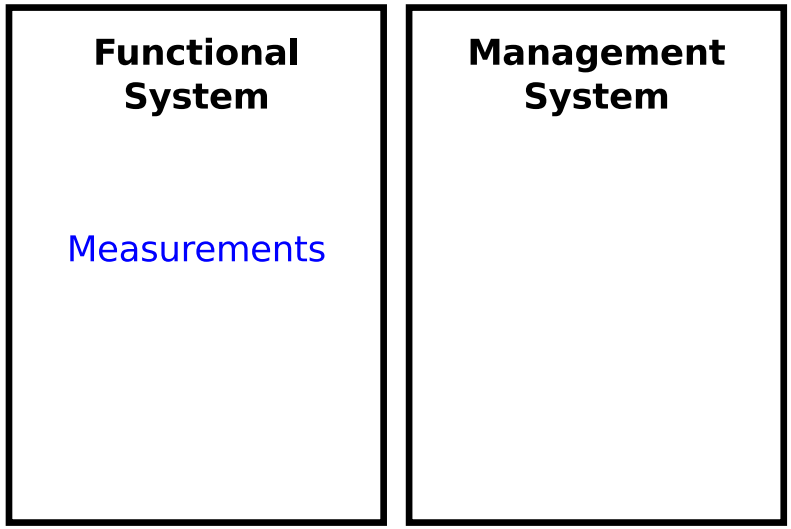

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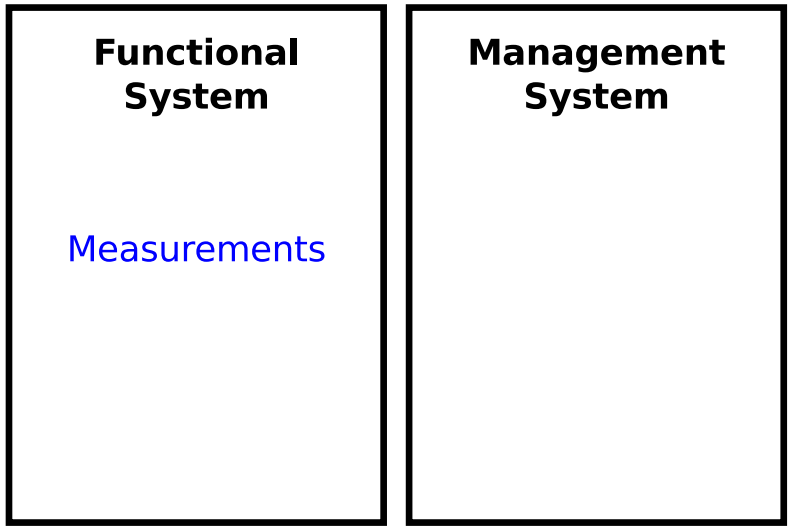

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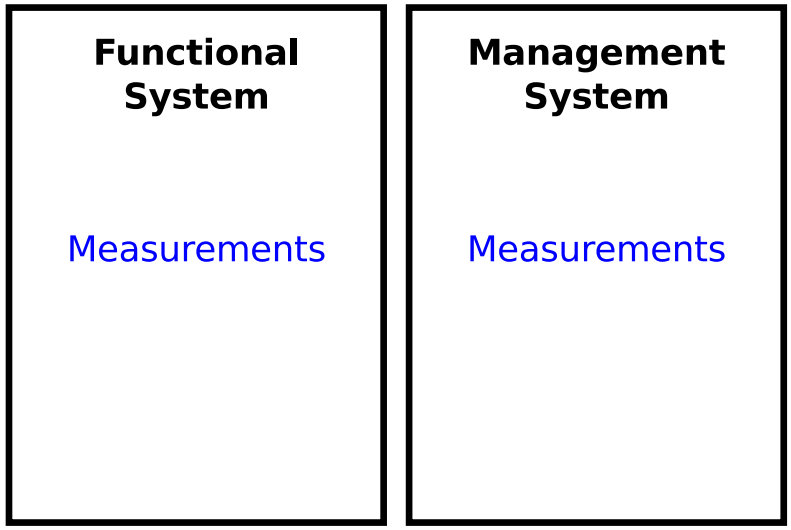

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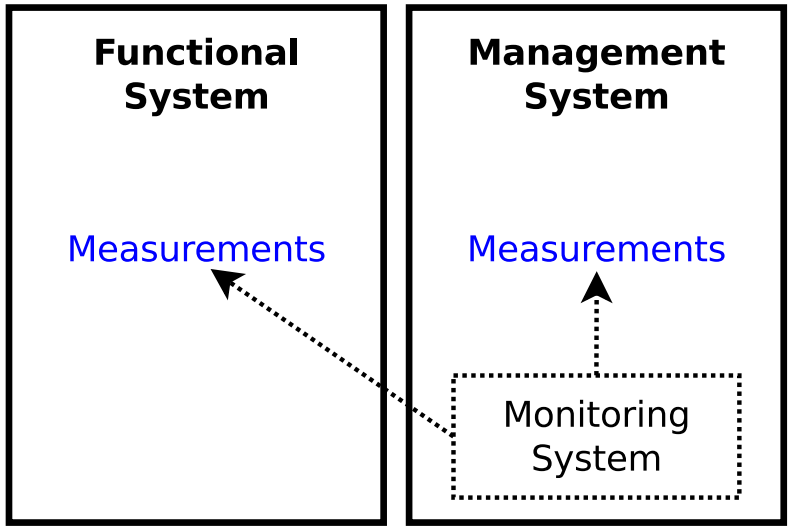

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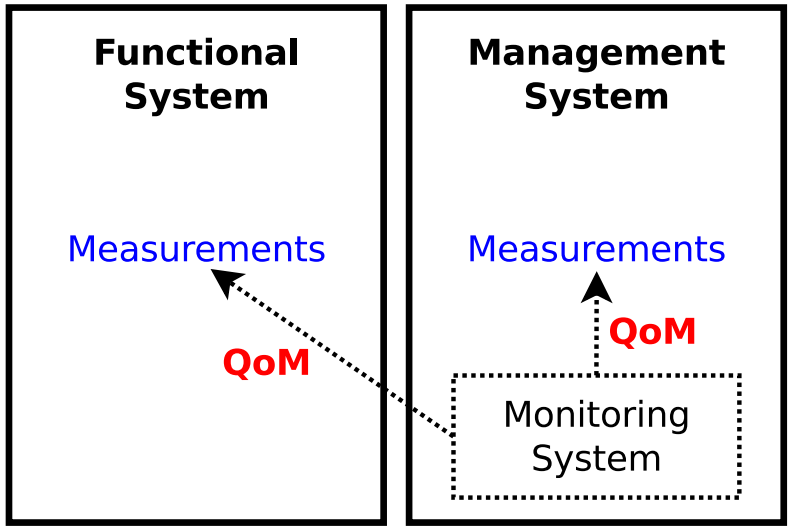


**Preliminary Assertion**

Monitoring System plays an important role → Thinking about QoM (Quality of Measurements)...

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- Monitoring Reconfiguration: changing behavior & architecture.
- Expressive Monitoring Adaptation: some sort of "semantic" behind adaptation.
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## In one phrase...

It is not sufficient to merely configure monitoring and its adaptation, starting from QoS specifications.

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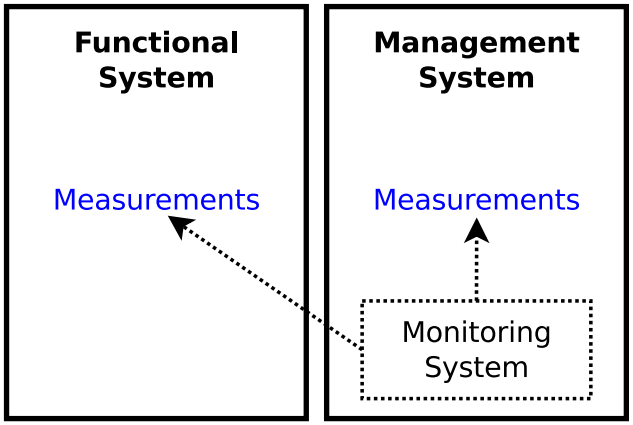

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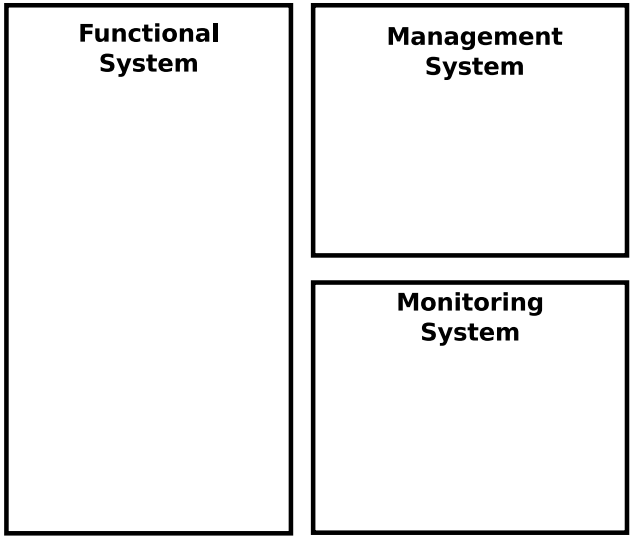

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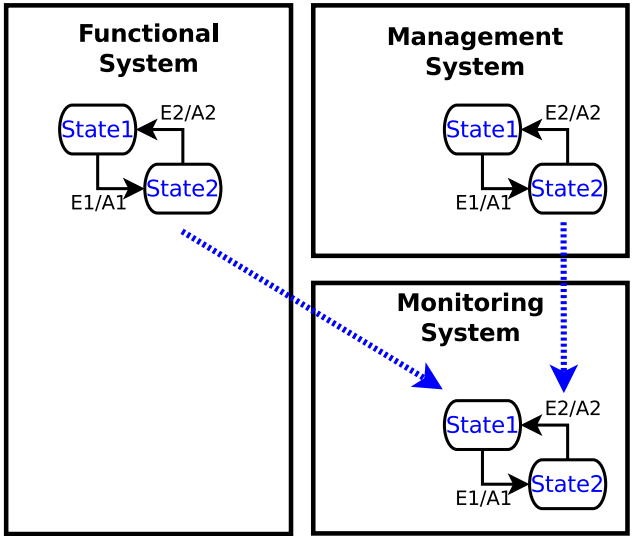

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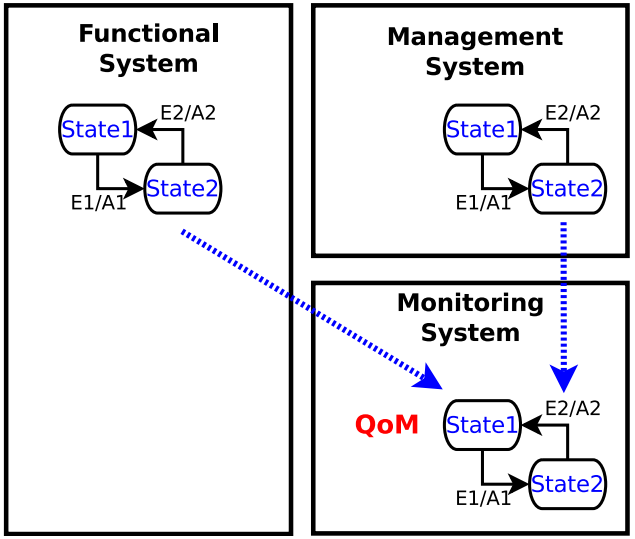

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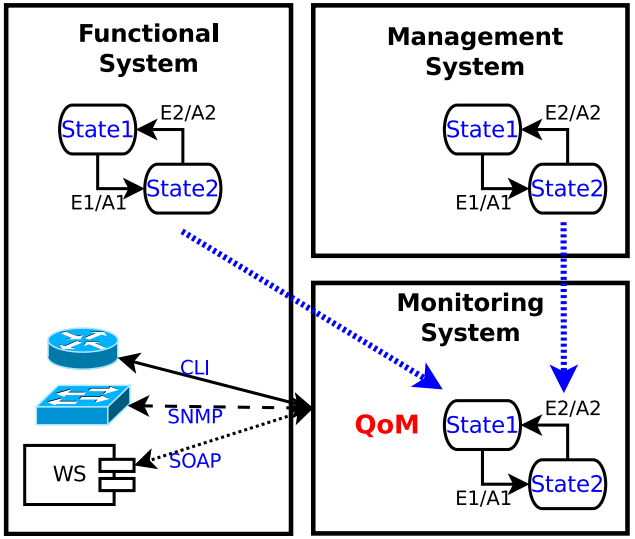

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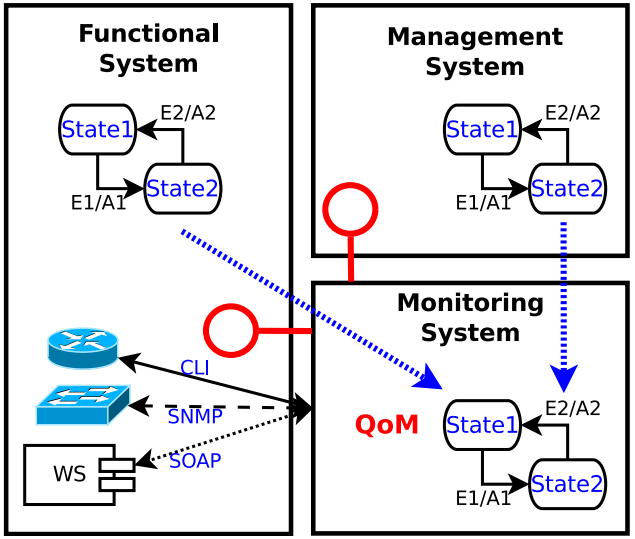

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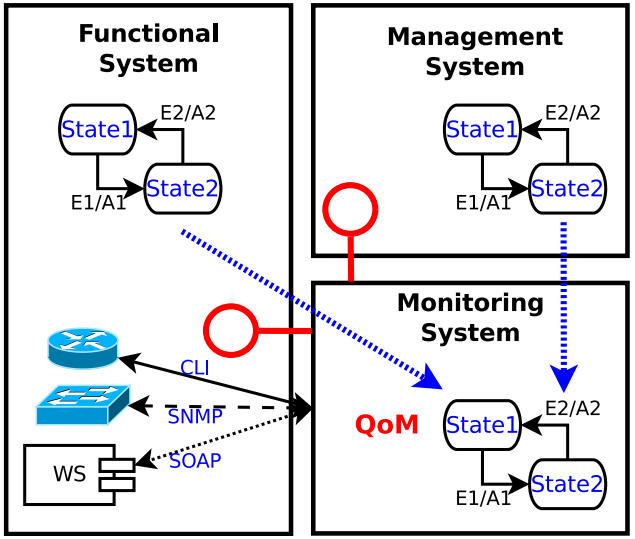


**Our approach...**

Leveraging on a methodology for twisting Functional, Management, & Monitoring expertise.

# A Novel Approach: RE for Managing Monitoring

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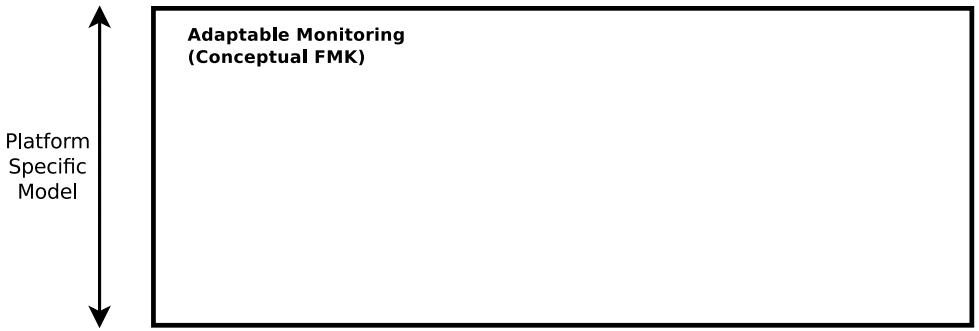

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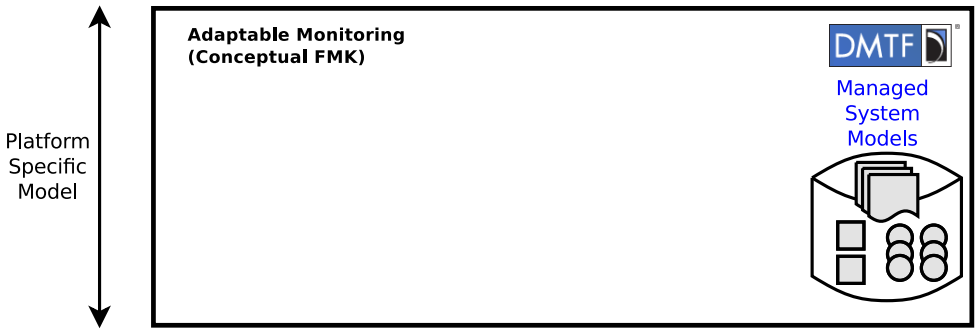


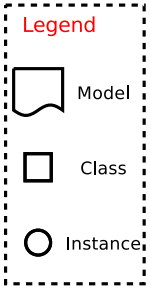

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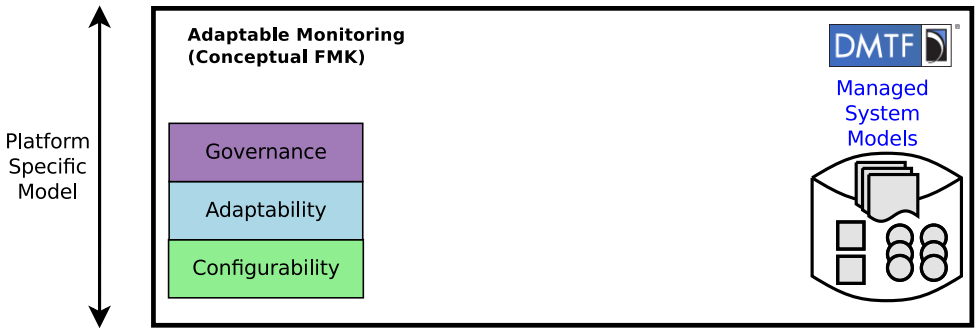


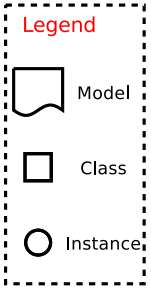

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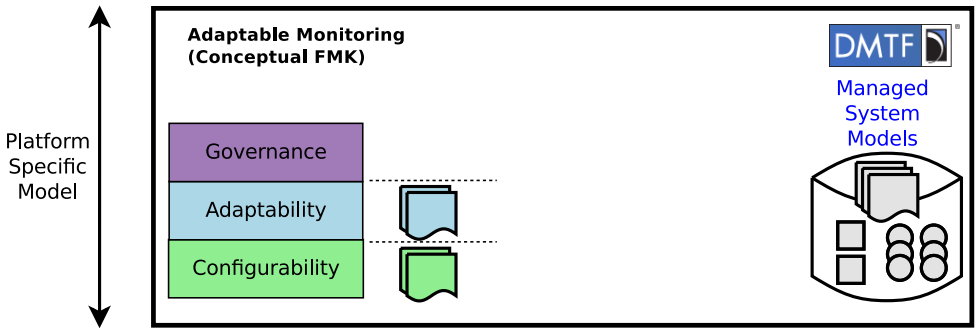


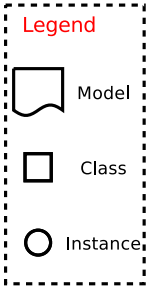

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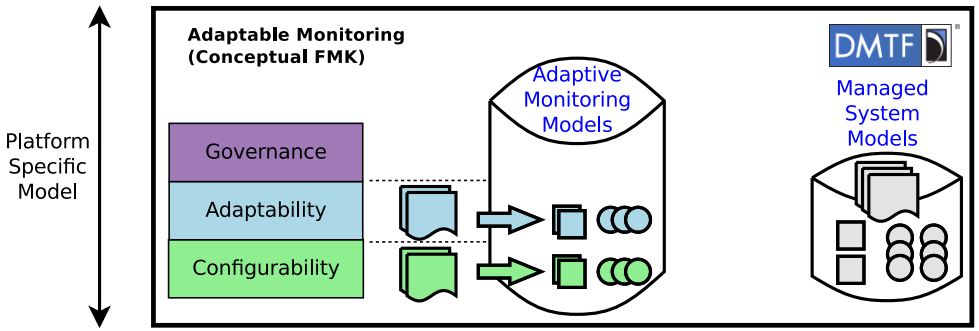


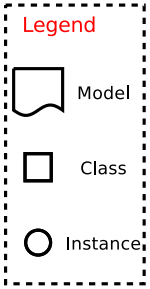

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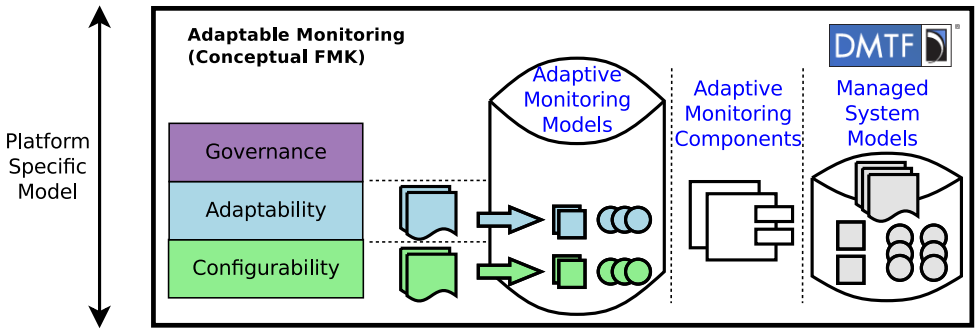


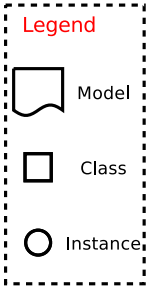

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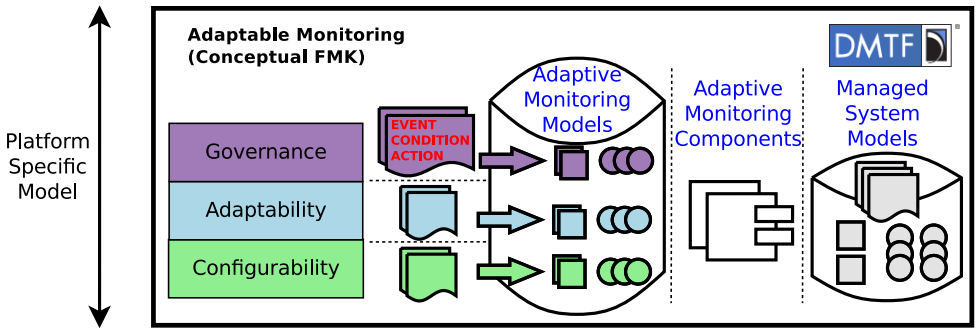


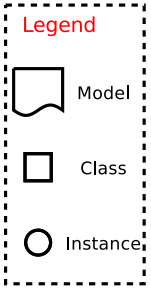

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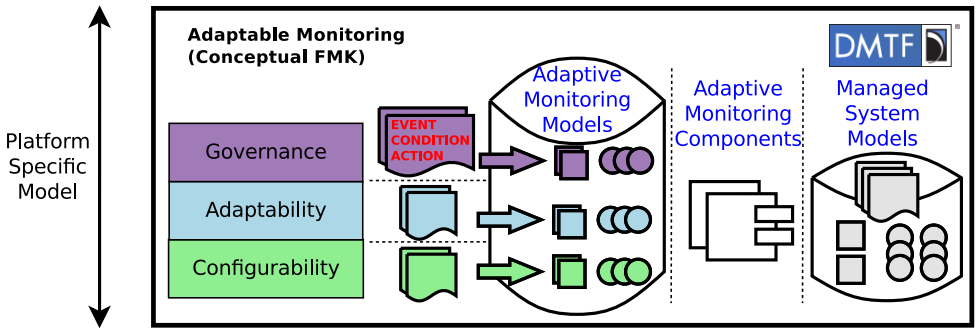


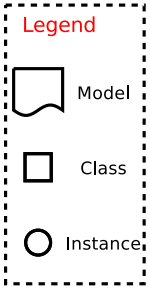

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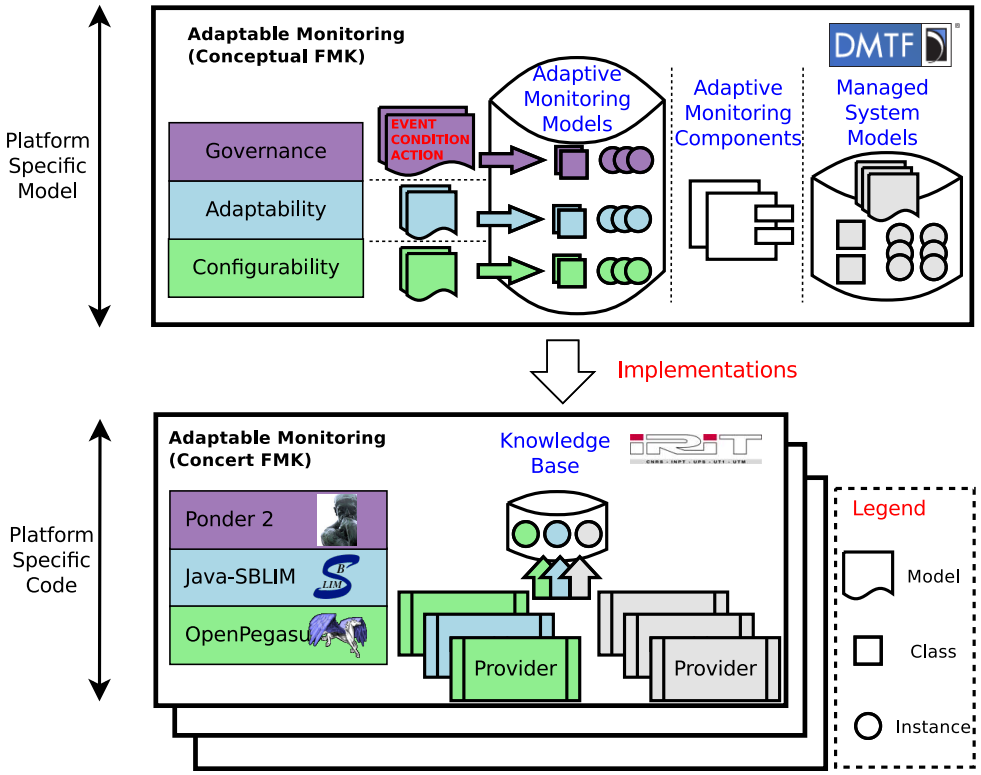

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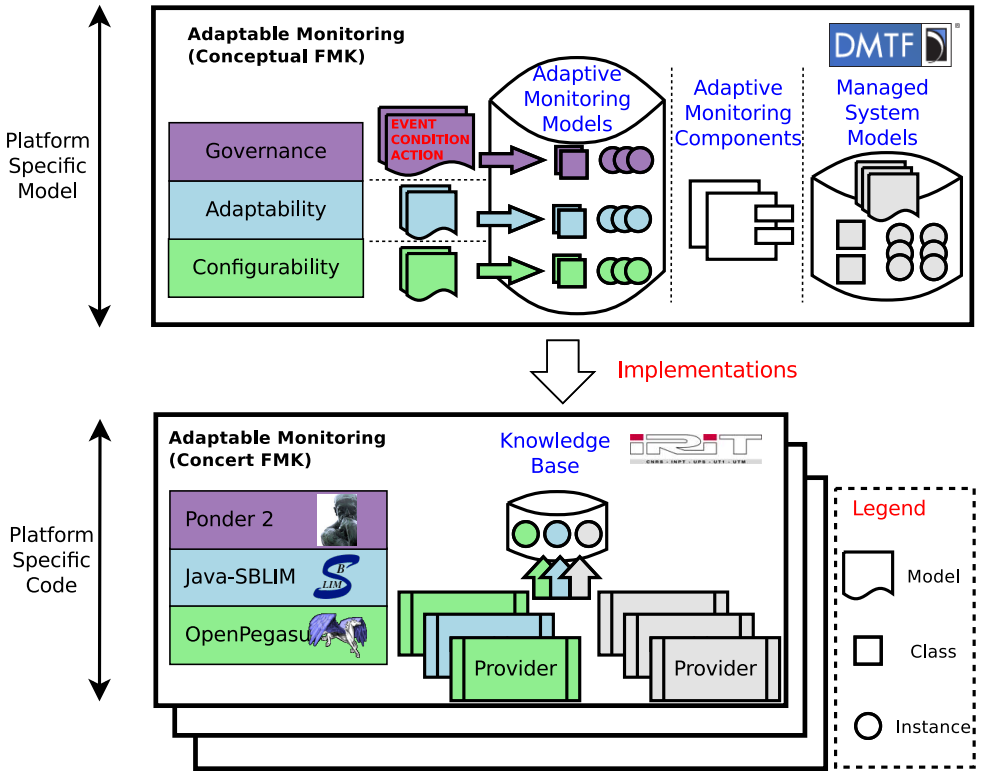

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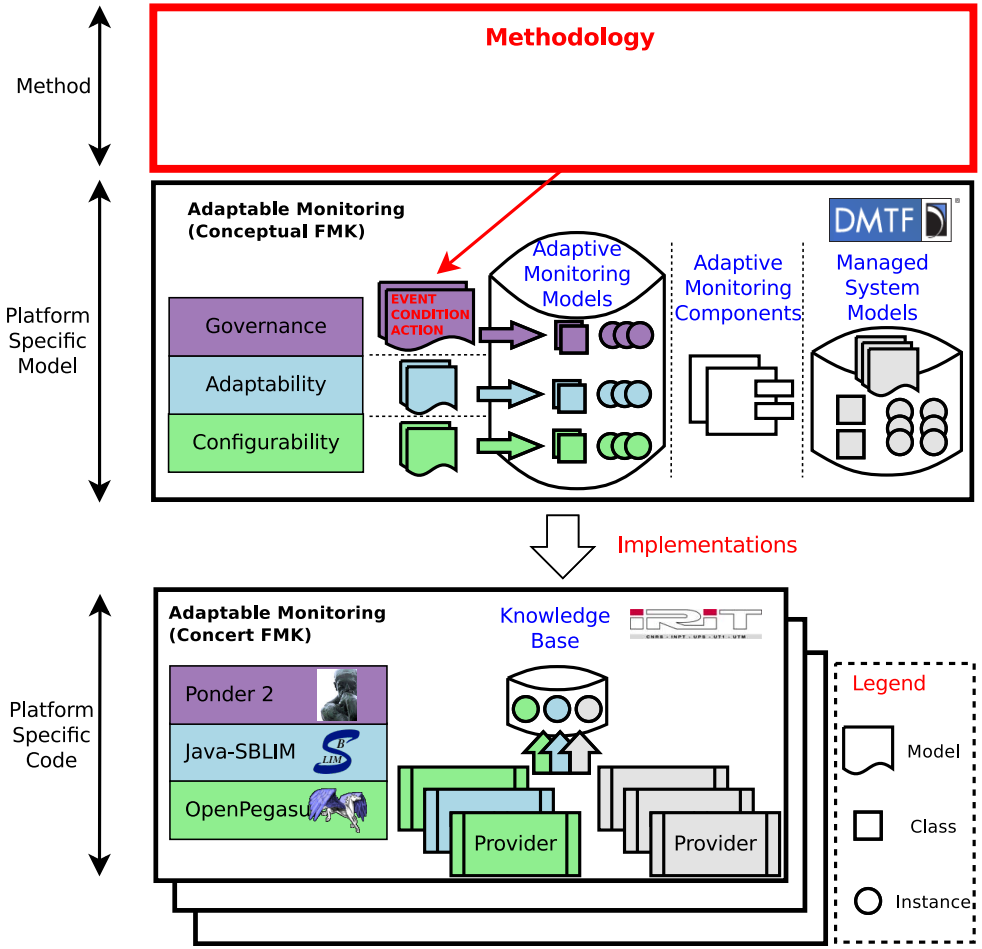

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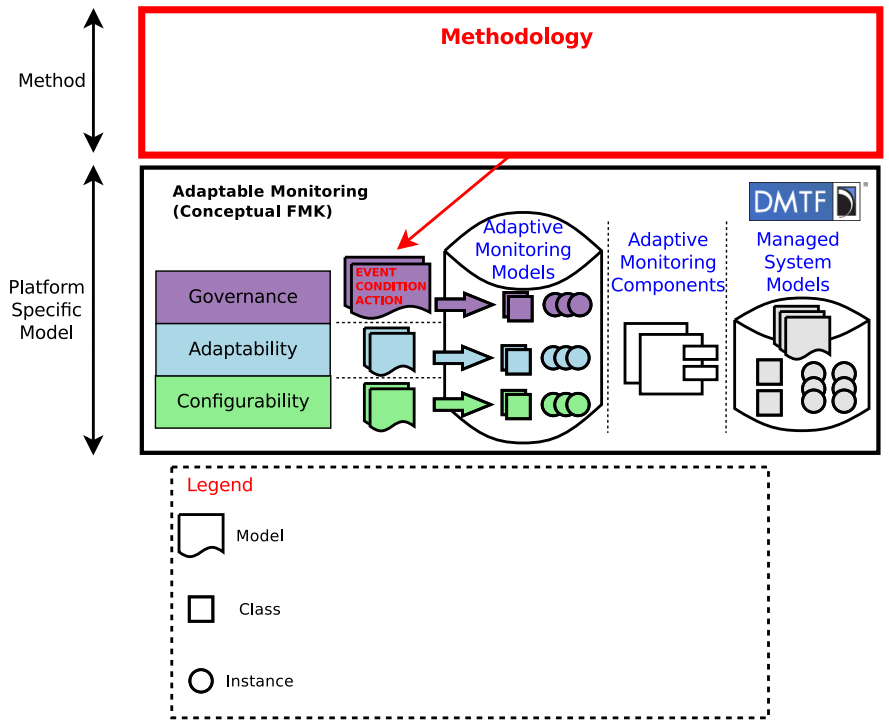


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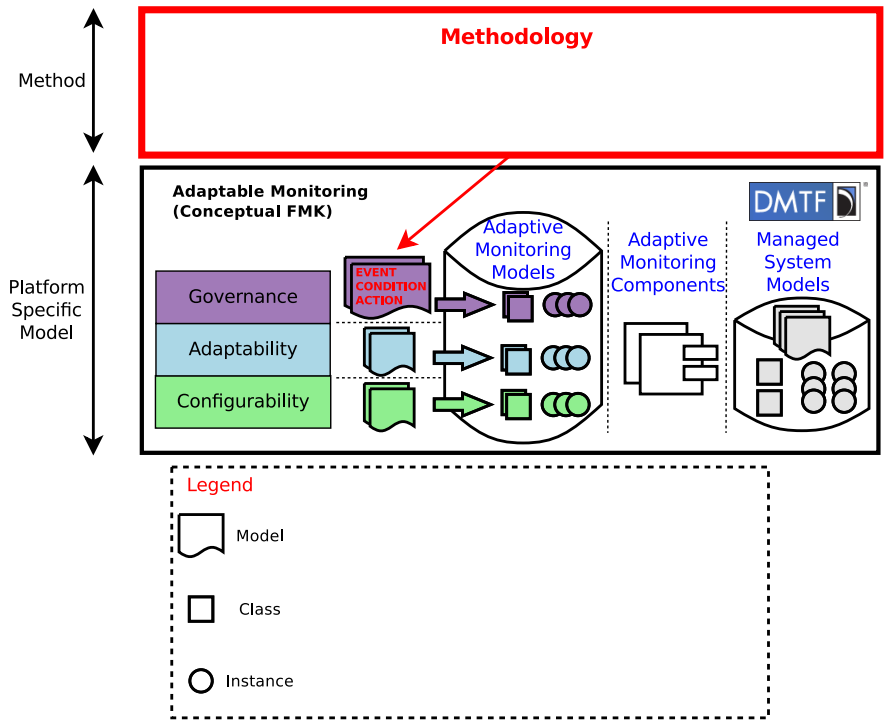


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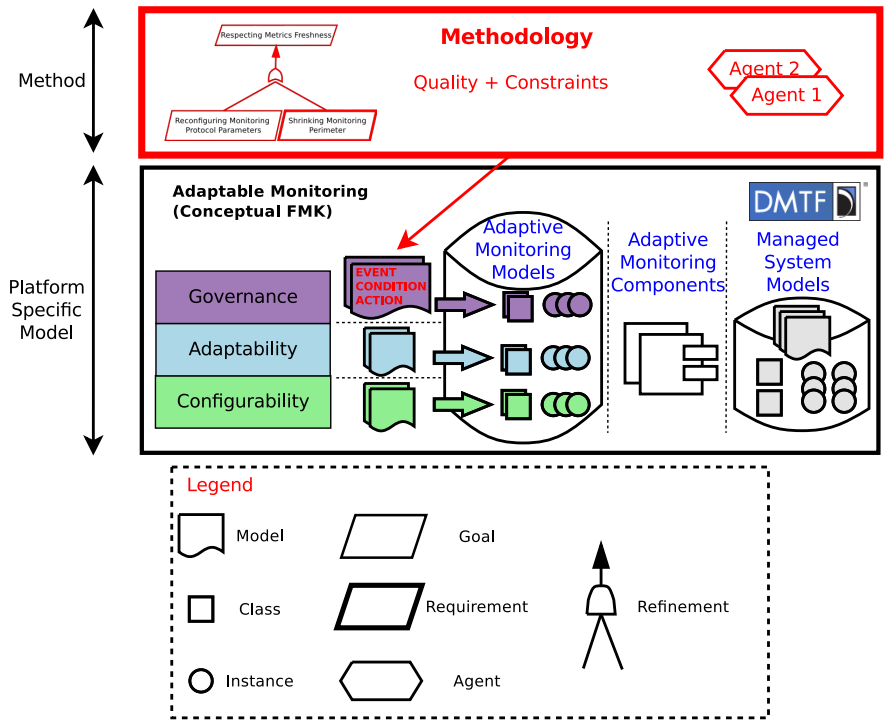


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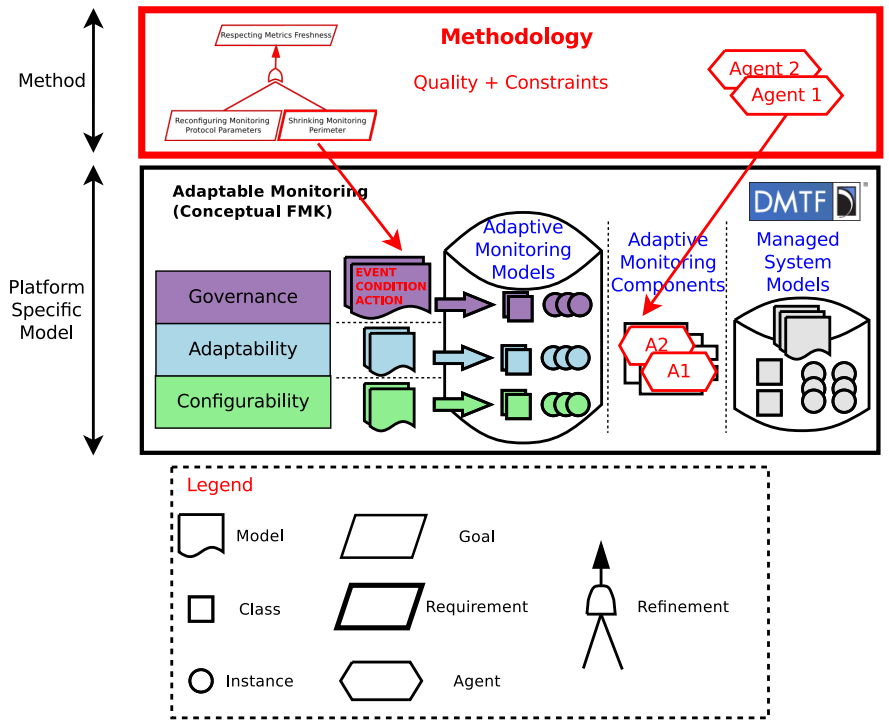


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# Use Case Implementation

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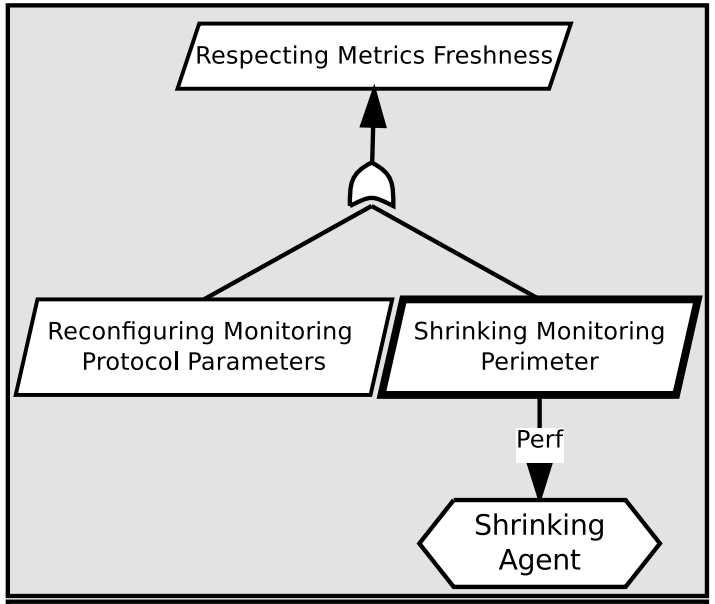

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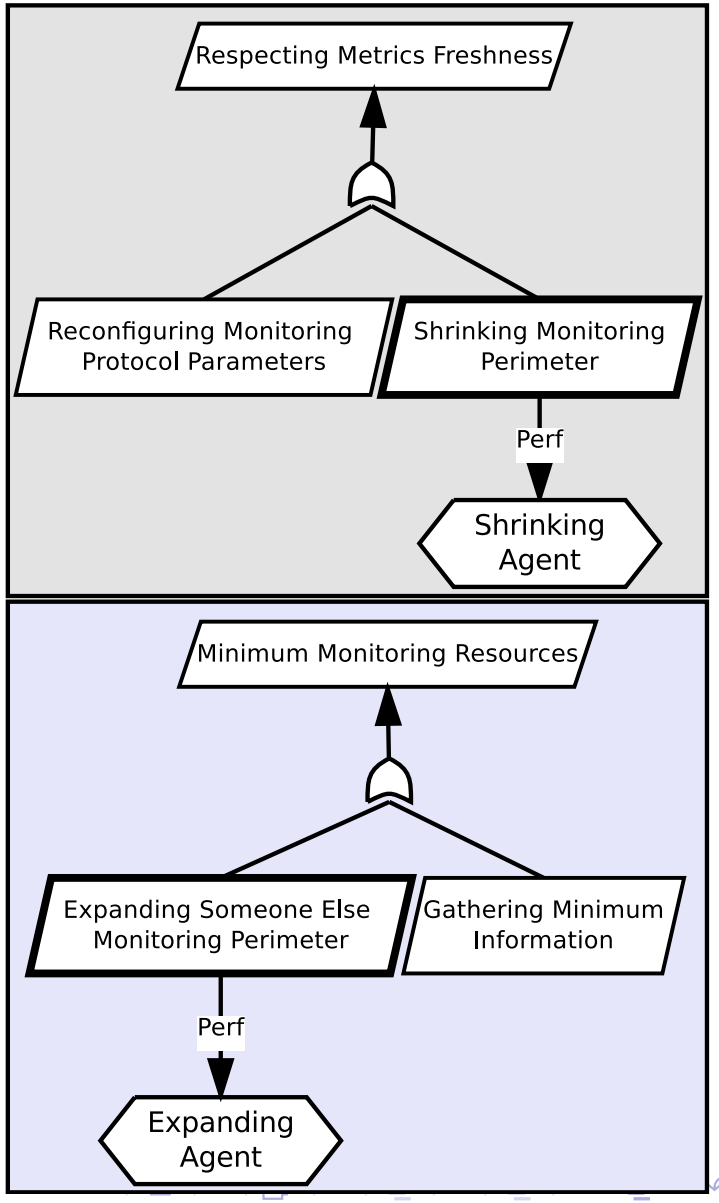
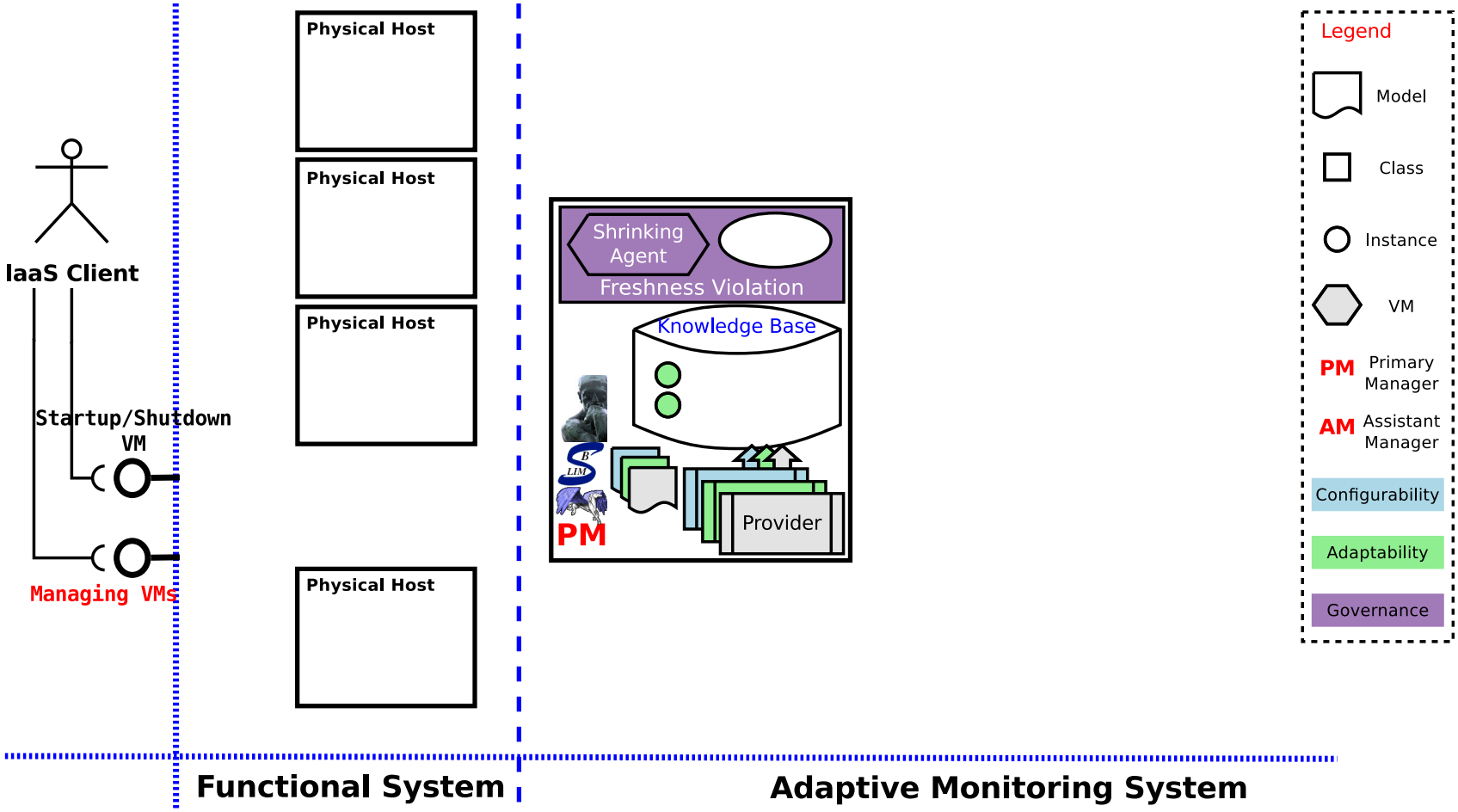
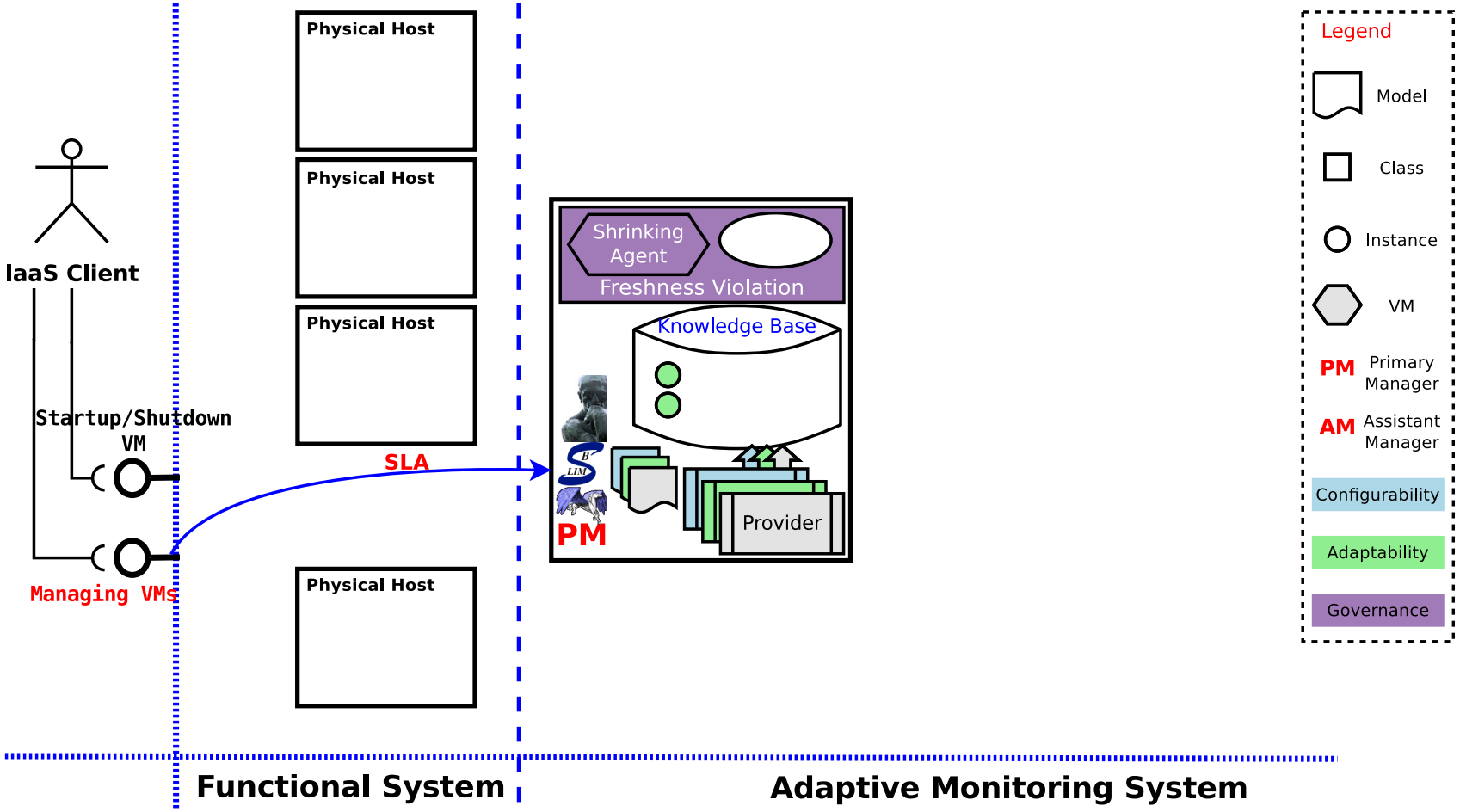
  - If freshness violations $>$ *Max_Threshold* $\rightarrow$ Shrink monitoring perimeter...
  - If monitored resources $<$ *Min_Threshold* $\rightarrow$ Expand "someone else" monitoring perimeter...



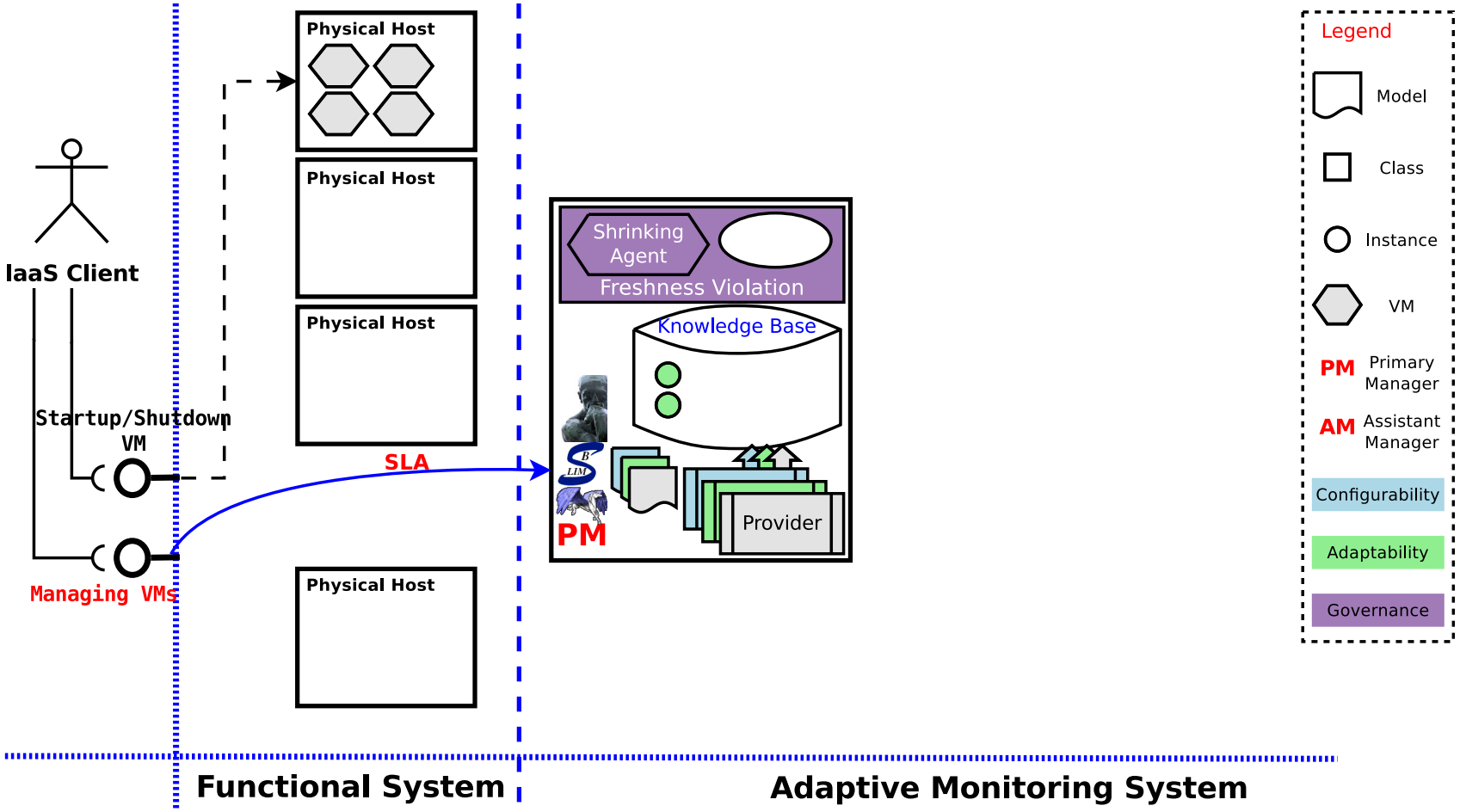
# Scenario Demonstration



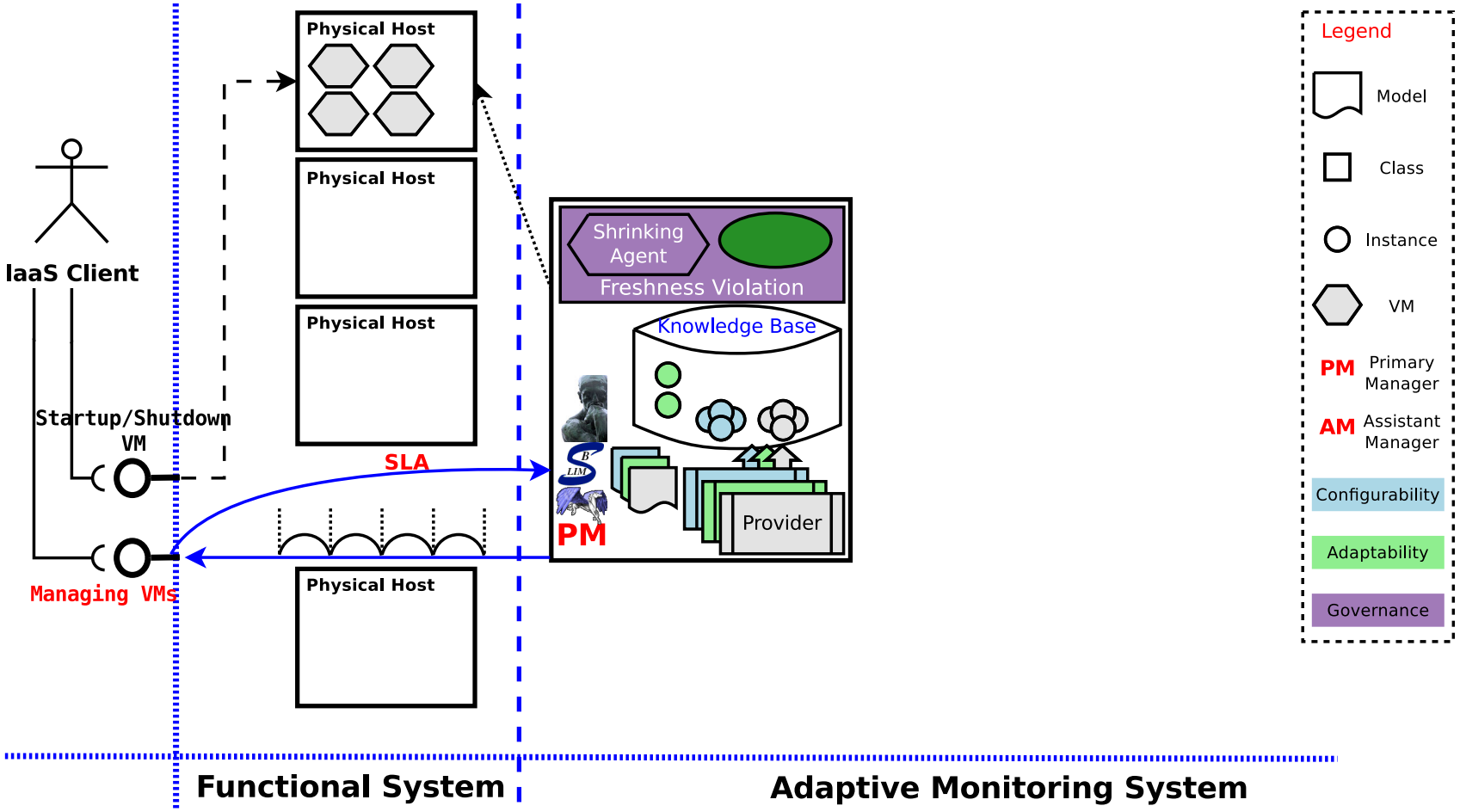
# Scenario Demonstration



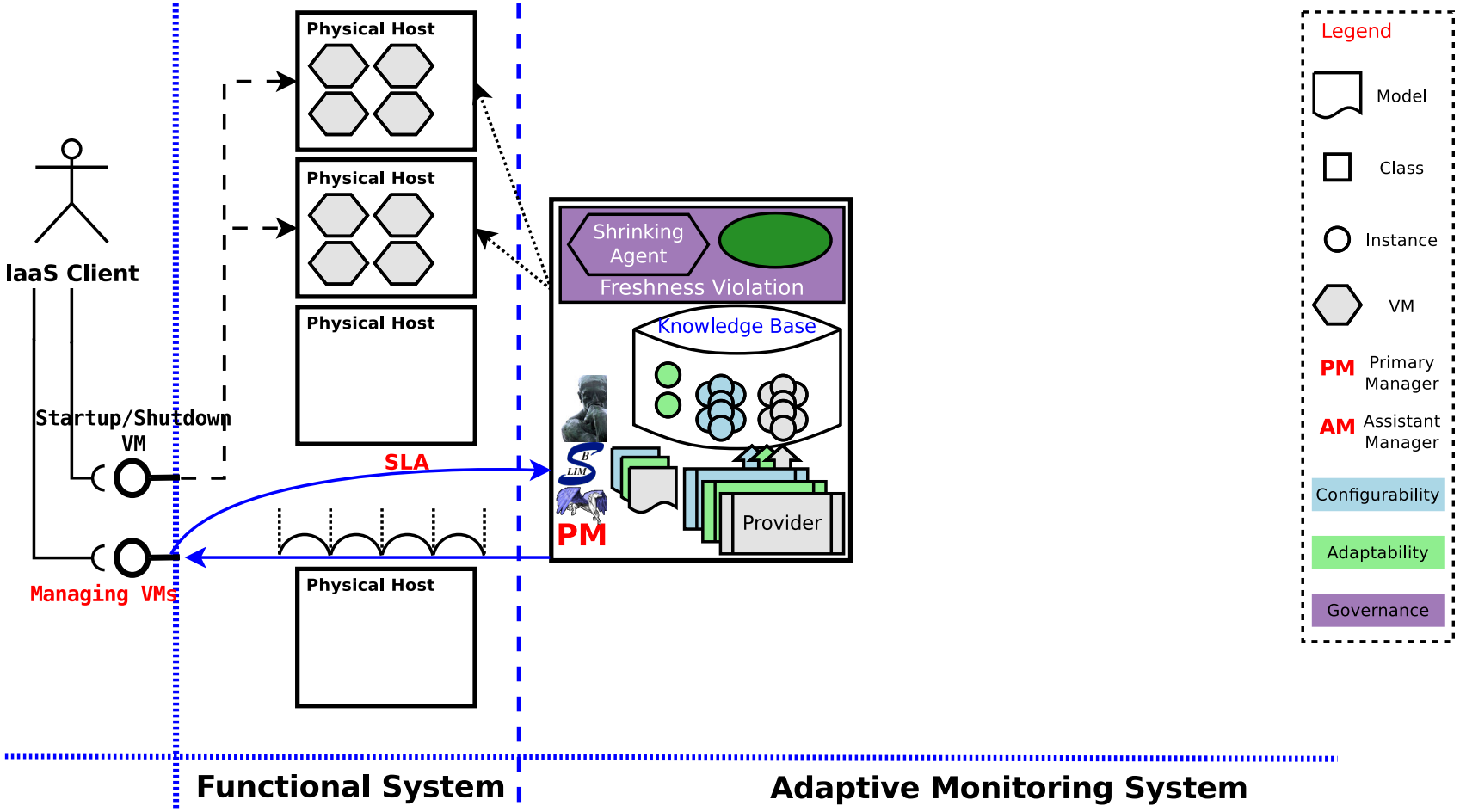
# Scenario Demonstration



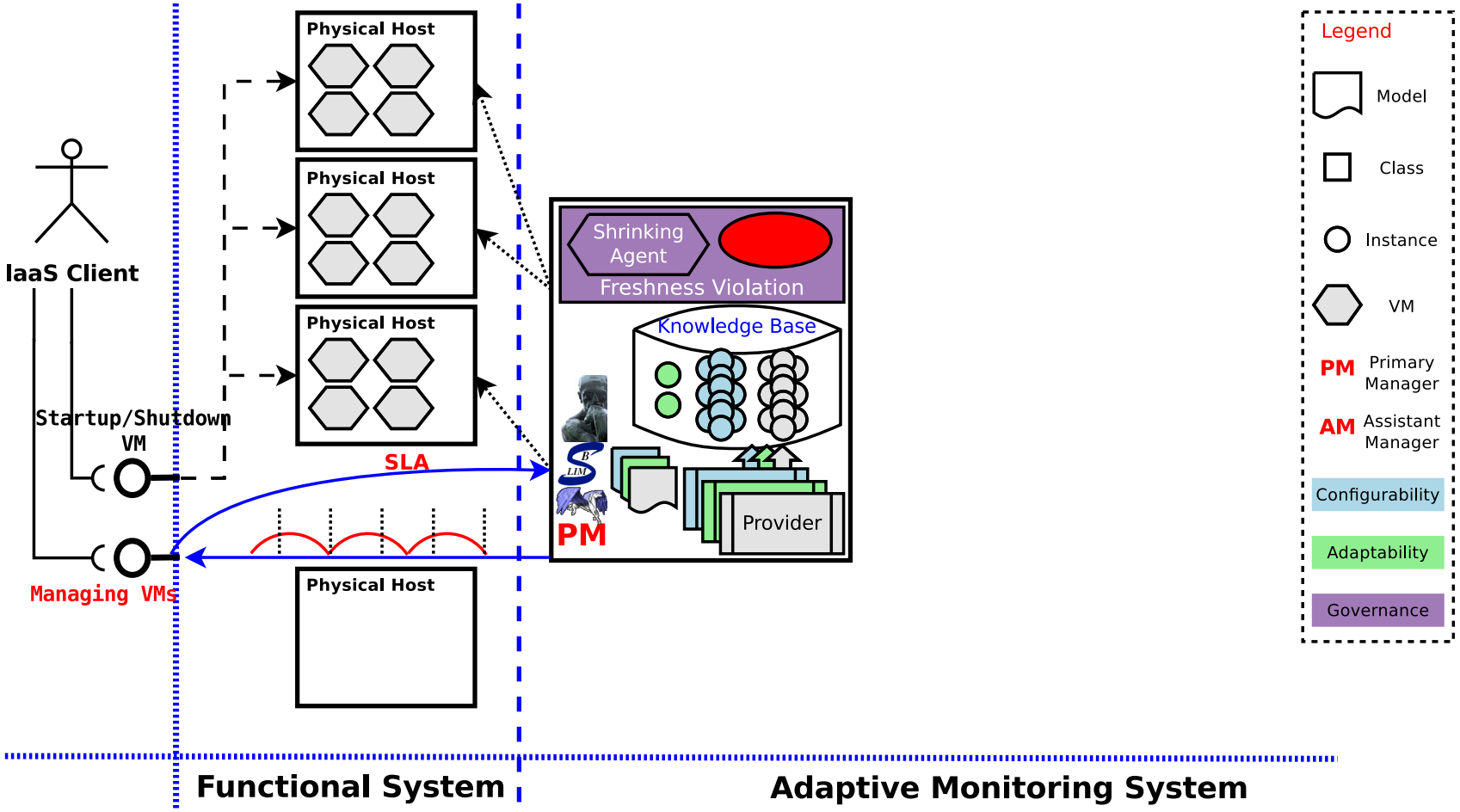
# Scenario Demonstration



# Scenario Demonstration



# Scenario Demonstration



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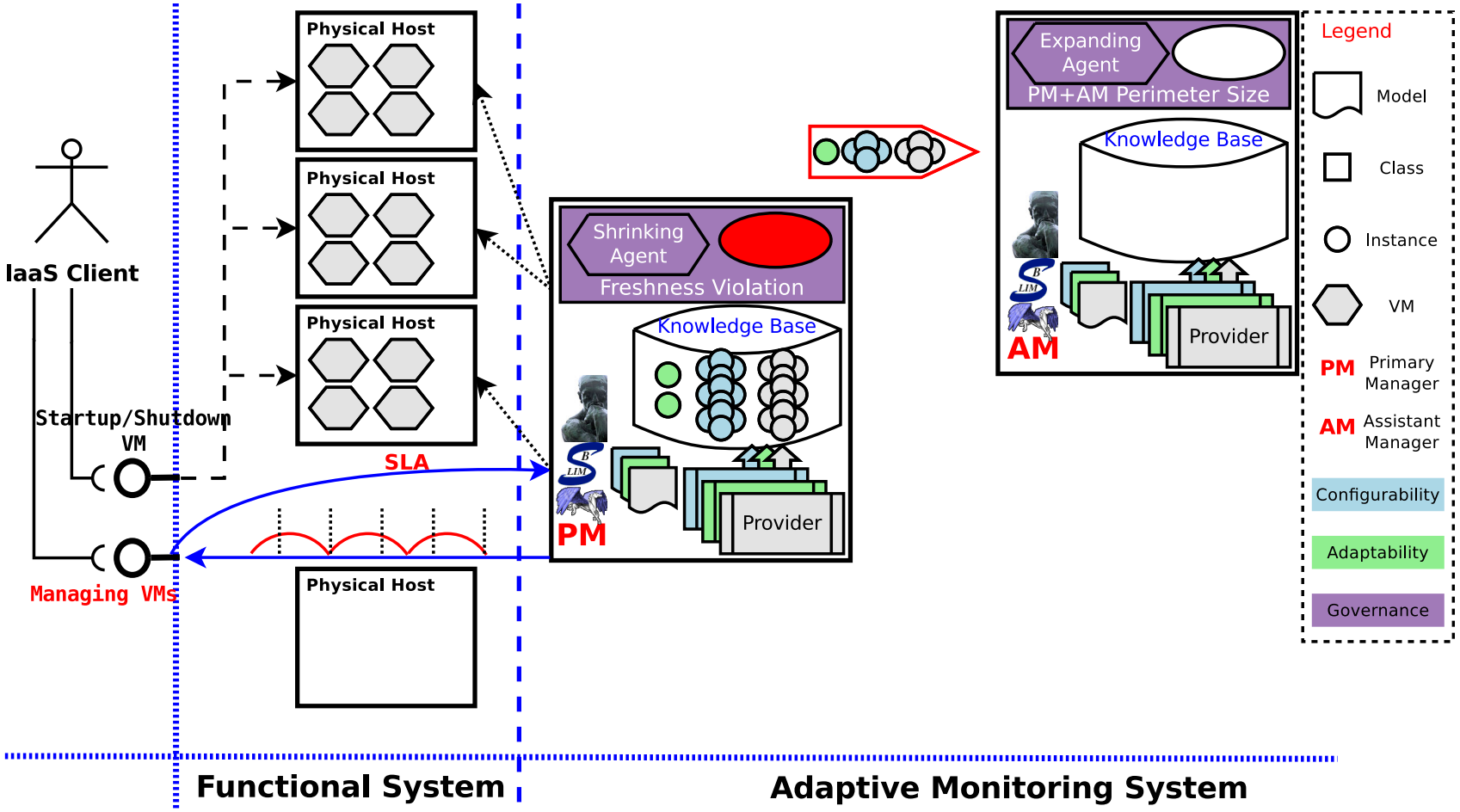
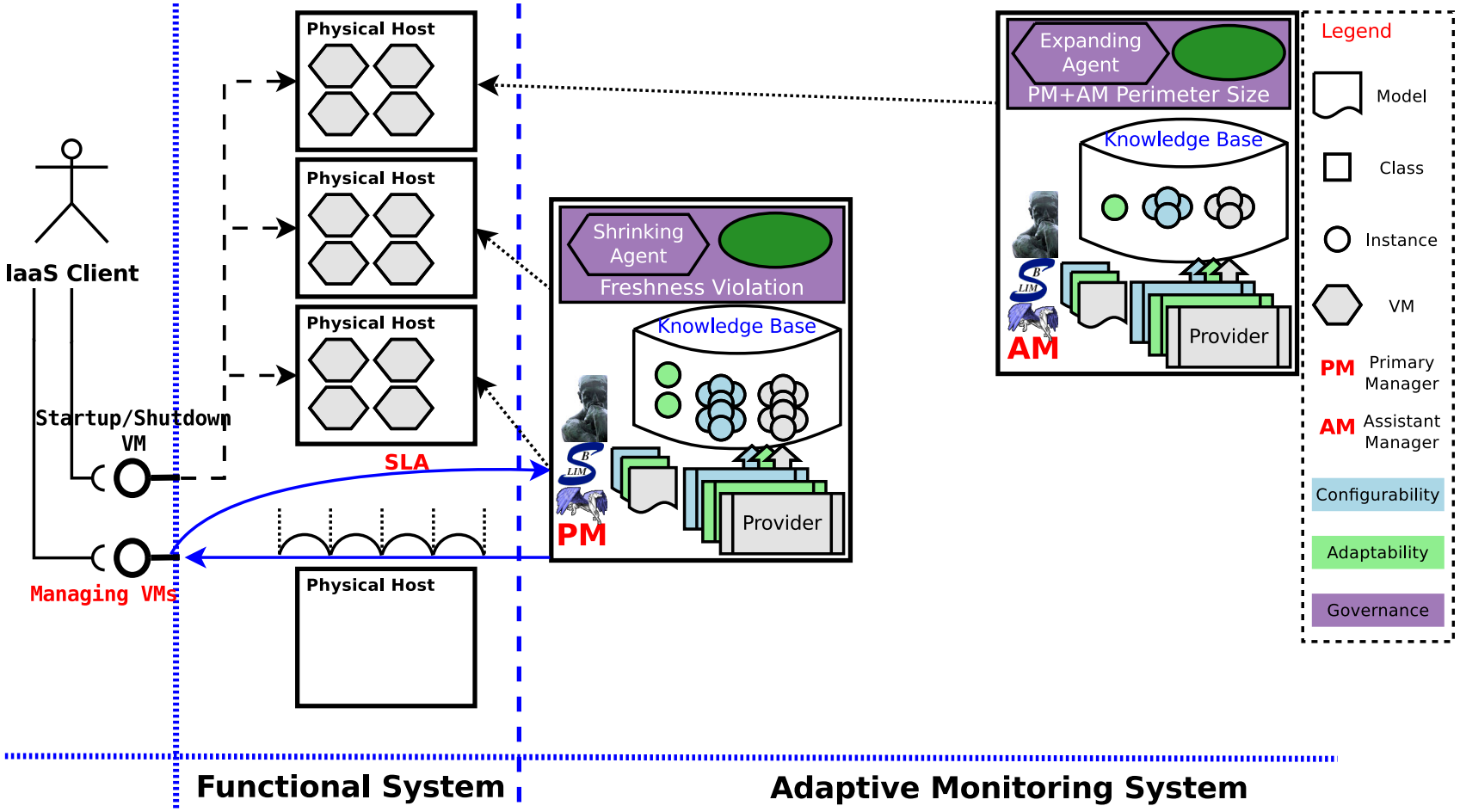


# Scenario Demonstration



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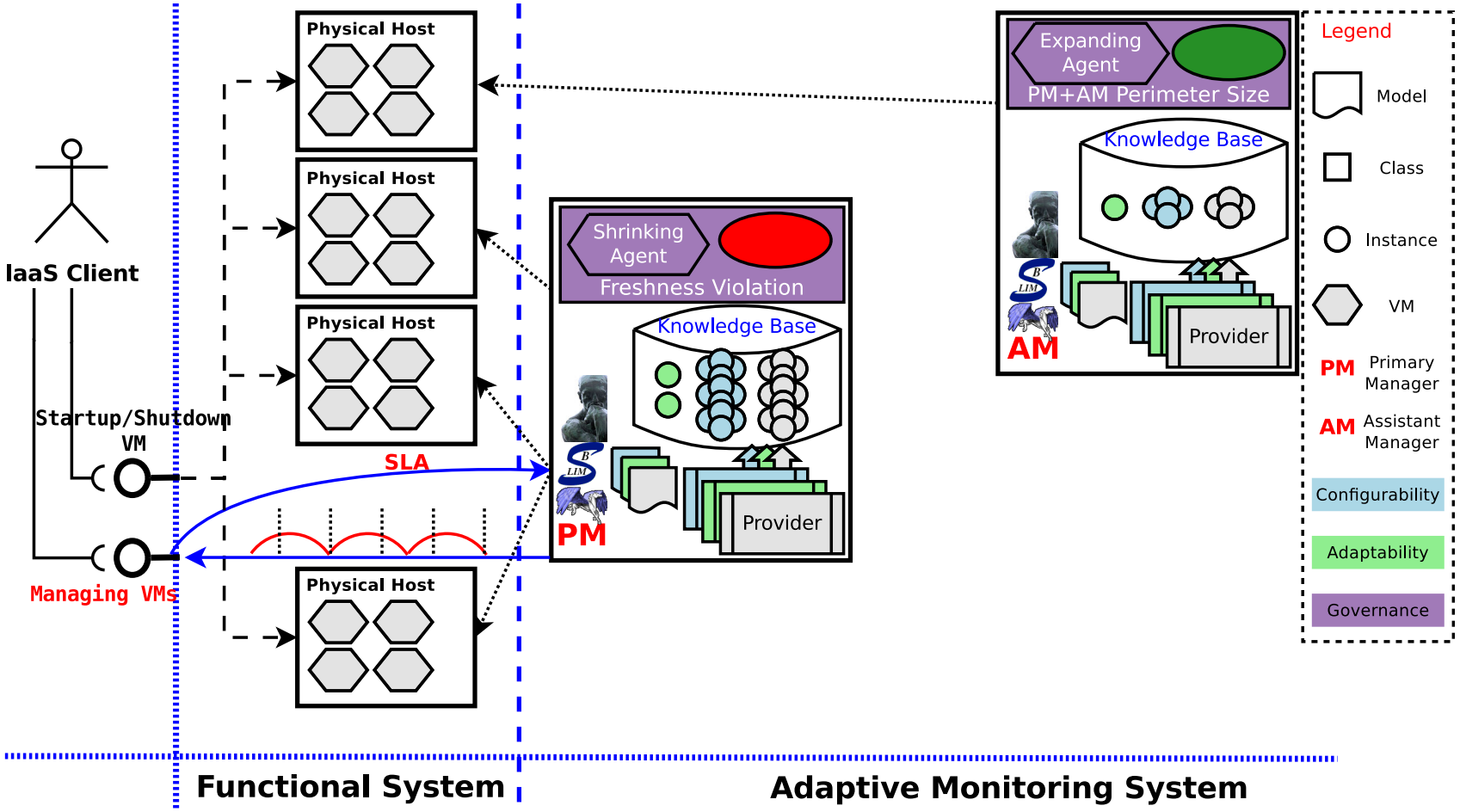

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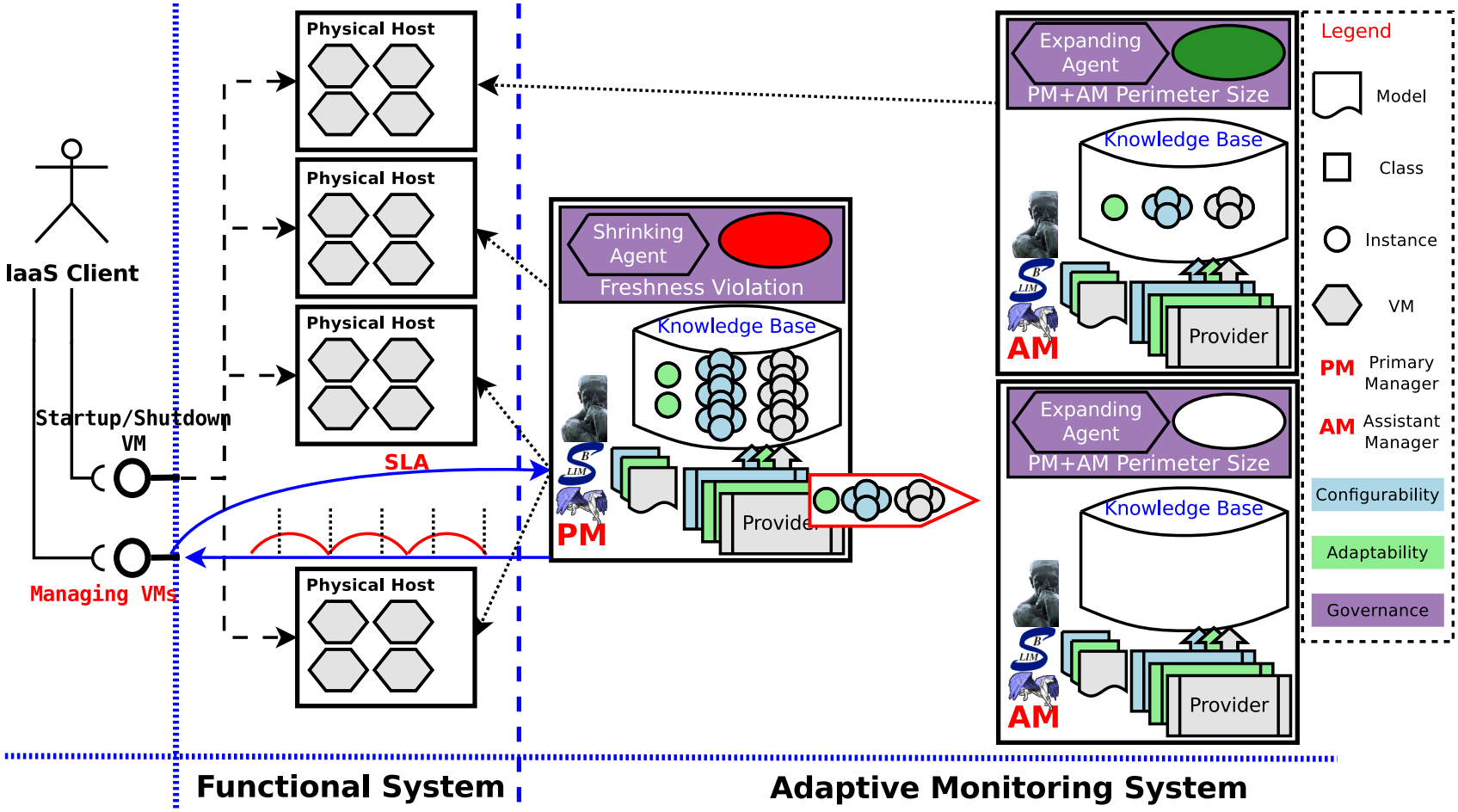

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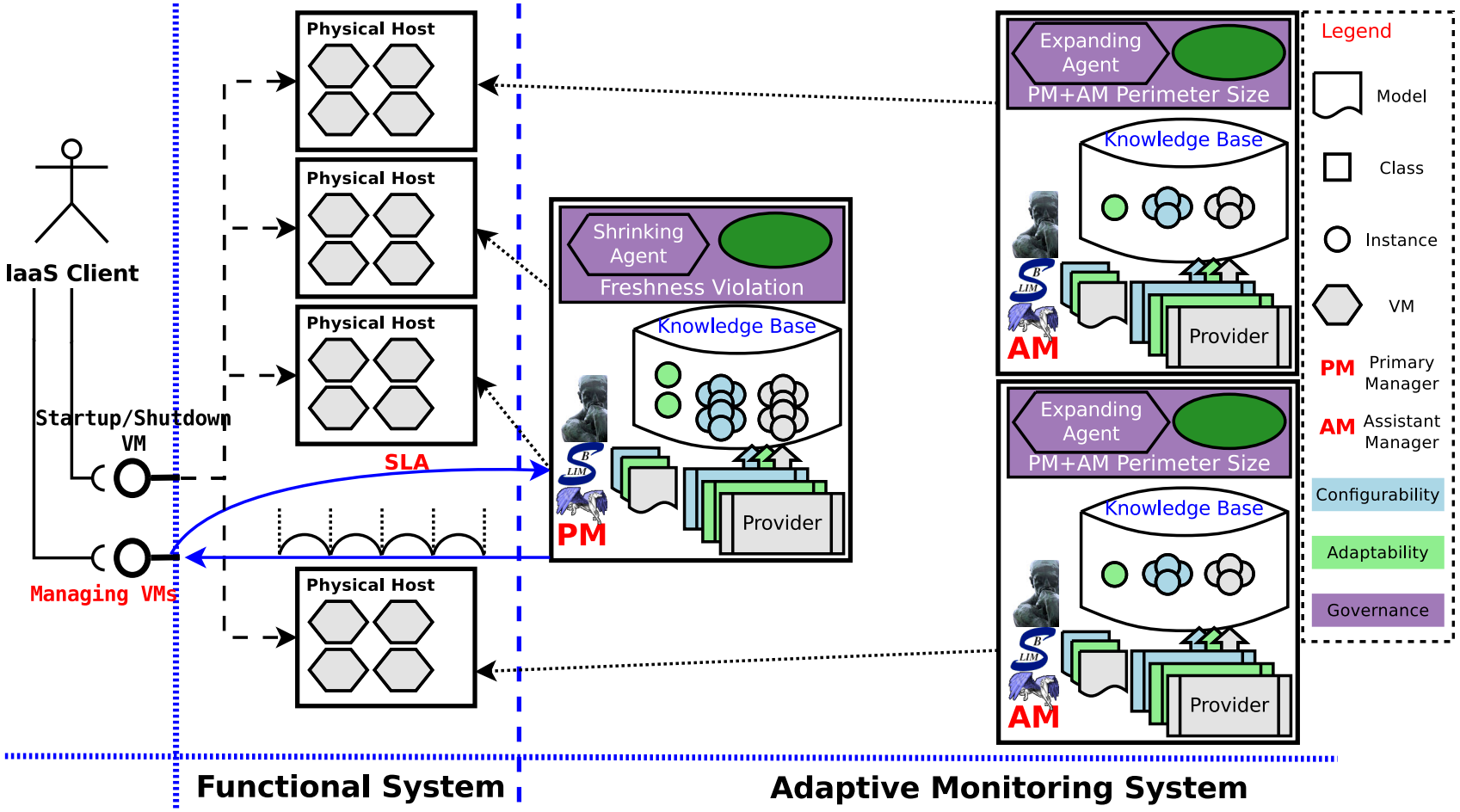
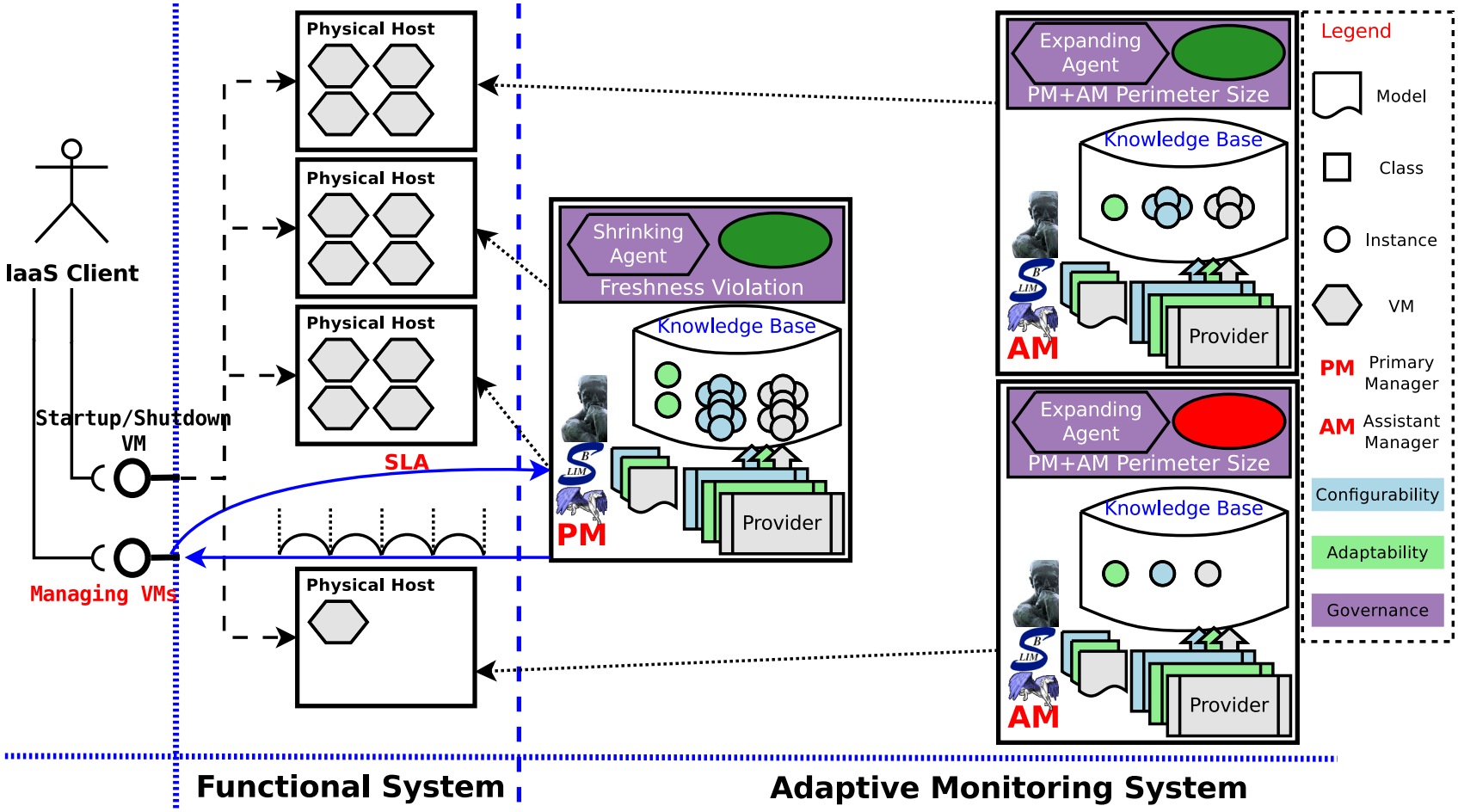
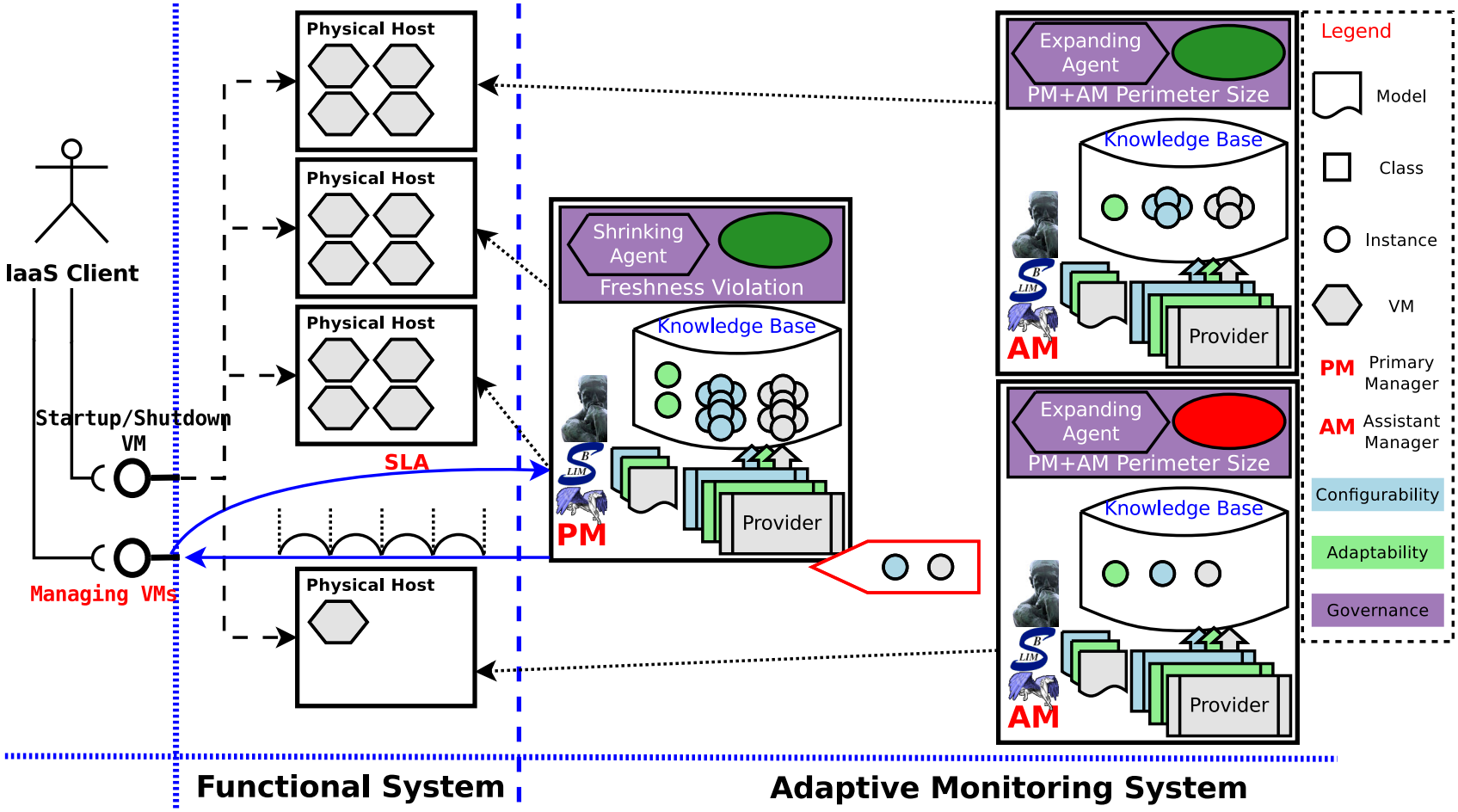


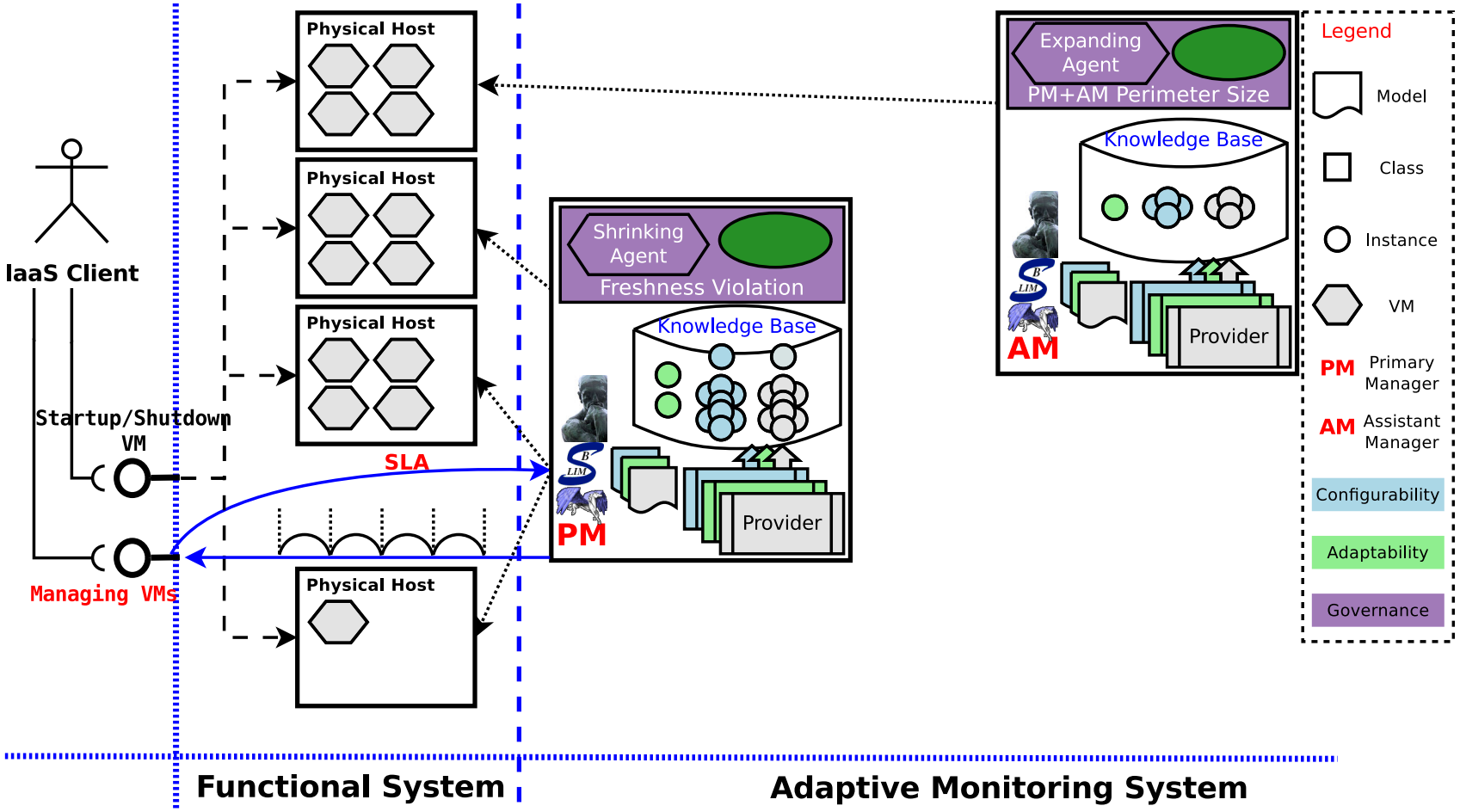
# Scenario Demonstration



# Scenario Demonstration



# Scenario Demonstration



# Conclusion

# What to keep in mind...

**About Shrinking/Expanding... What to do in other scenarios....**

Exploiting RE methodology to instrument *Governance Level*.

- Determining the adaptation triggers: Instantiating metrics & constraints instances ($\rightarrow$ instrumenting & evaluating).
- Determining the adaptation policy: Instantiating adaptation policy ($\rightarrow$ "Subscribing" to constraints violations).

# What to keep in mind...

## About Shrinking/Expanding... What to do in other scenarios....

Exploiting RE methodology to instrument *Governance Level*.

- Determining the adaptation triggers: Instantiating metrics & constraints instances (→ instrumenting & evaluating).
- Determining the adaptation policy: Instantiating adaptation policy (→ "Subscribing" to constraints violations).

## The advantages of this approach....

- Proposing reusable models.
- Minimizing development cost.
- Being independent of the technological platforms.
- Providing Monitoring "as a Service" for Functional & Management Systems.

# Questions

Thanks for your attention...