

Stable Automation Pattern

Core Knowledge and Application

By

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Introducing Software Stability Concepts

- ❑ Software Stability concepts provide a stable and reusable core.
- ❑ This core is represented via the EBTs and BOs of the system.
- ❑ This core be patterned to serve as a stable core for other applications sharing the same EBTs and BOs.
- ❑ Knowledge is detached from implementation specific aspects.

Software Stability Concepts cont.

- EBTs: are intangible entities that remain stable internally and externally over time. Enduring Business Themes.
- BOs: are the workhorses of EBTs. They remain internally adaptable and externally stable over time. Business Objects.
- IOs: These are the implementation specific aspects of the system with respect to a specific context. They are the surface of the system to be developed. Industrial Objects.

Stable Automation Pattern Definition

- This pattern represents the core insight of the automating processes, mechanisms, as a whole, through the utilization of mechanical and/or electronic devices that can be spanned in a wide variety of application domains while keeping in mind that certain human intervention may be present (i.e. monitoring).
- Problem:
 - To create an analysis pattern that will be applied across multiple domains where the automation insight is presented or to be introduced in a system.
 - The solution needs to have room for flexibility with respect to *where* and *what* to automate within a given system.
 - The pattern should allow for the possibility of full automation as well as partial automation.
 - The main problem we face is how to achieve this challenge and to truly *discover* a stable form for automation.

Stable Automation Pattern Definition_{cont..}

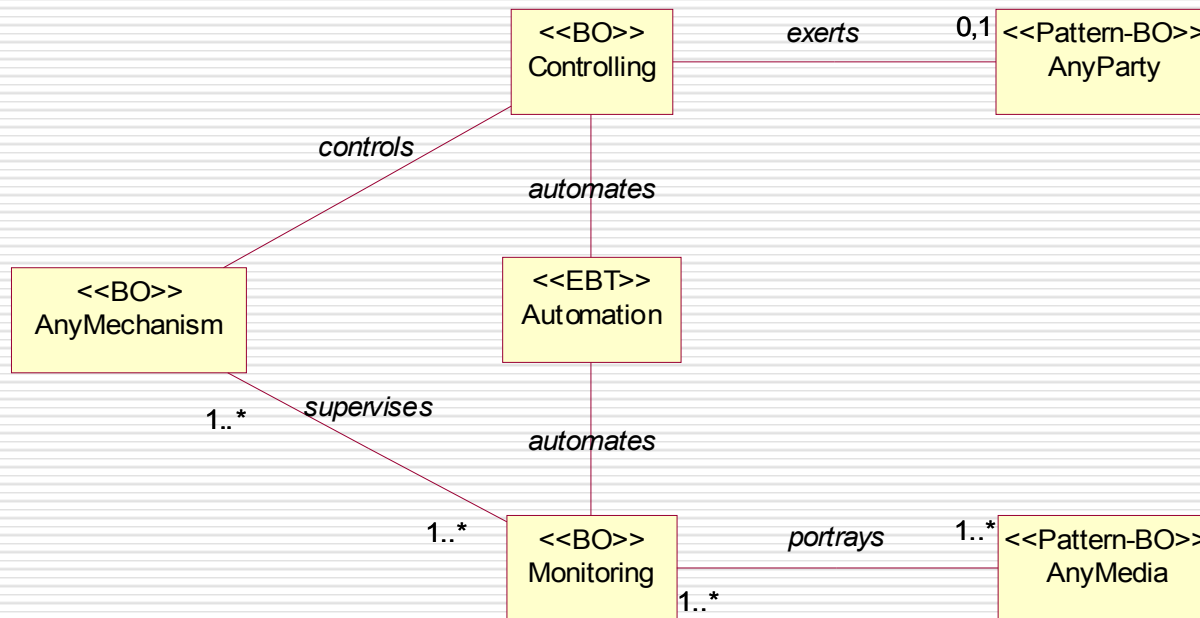
□ Context:

- Automation is virtually present in every area, from industrial production systems to control and regulation of public services, banking, commerce, aviation, etc.
- The call upon automation will depend on if automated processes or mechanisms are required, along with some cognitive behavior (i.e. decision making and planning) that needs a minimum or “not at all” influence from humans.
- The definition of level of automation for a determined task or process. From partial to full automation, and with or without human intervention.

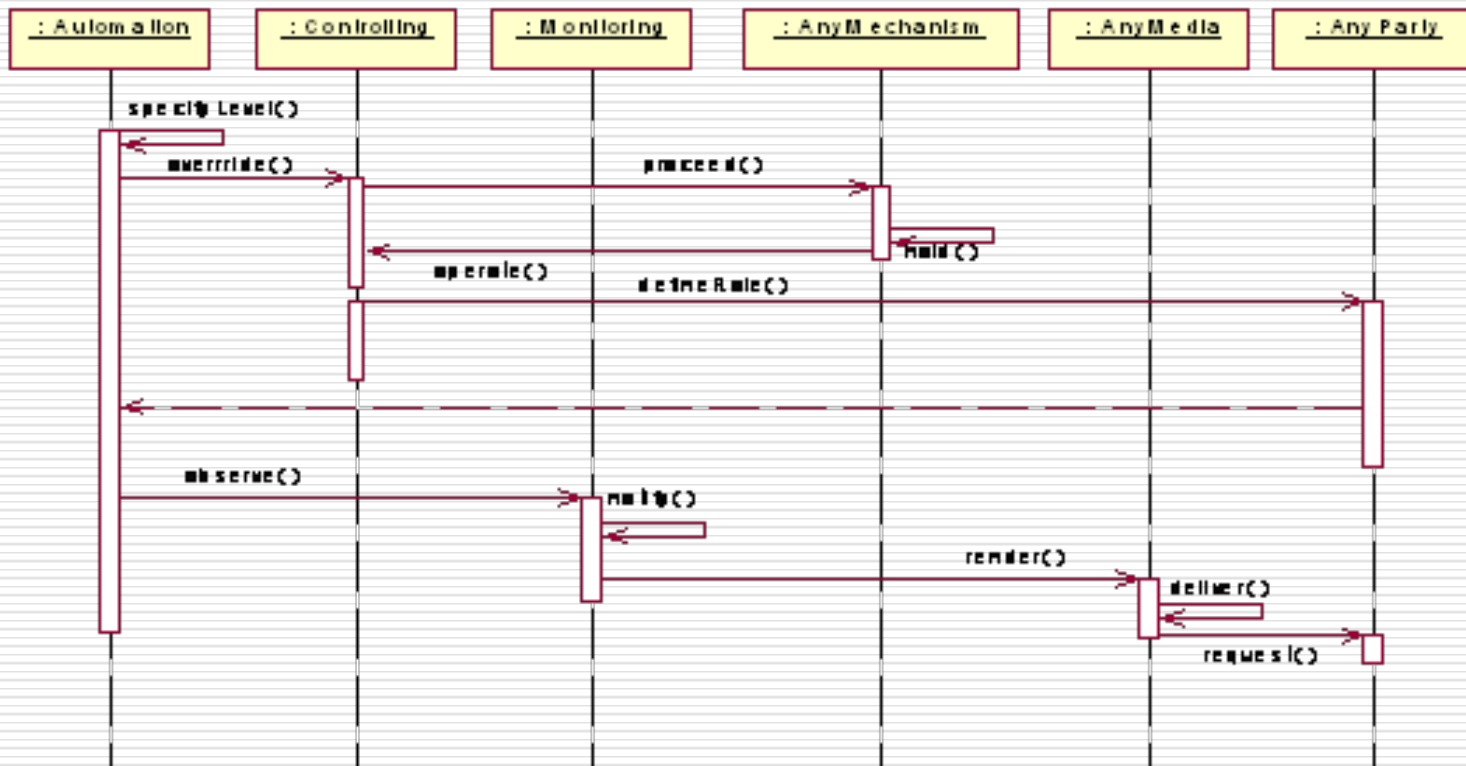
Stable Automation Pattern Definition

- Forces:
 - The definition of a general enough pattern to be shared among dissimilar domains.
 - A pattern that encompasses monitoring and controlling aspects of automation.
 - A Pattern that handles the distinct levels of automation execution on a continuum. Full Automation, Partial Automation.
 - A Pattern that provides a high level of flexibility for handling different structures and roles in case human intervention is present or not.
 - A Pattern that embodies the distinct types of processes and mechanisms involved in the automation process.
 - A Pattern that provides an abstract definition of the distinct media involved in the automation process.

Stable Automation Pattern Solution



Stable Automation Pattern Solution cont



Stable Automation Pattern Participants

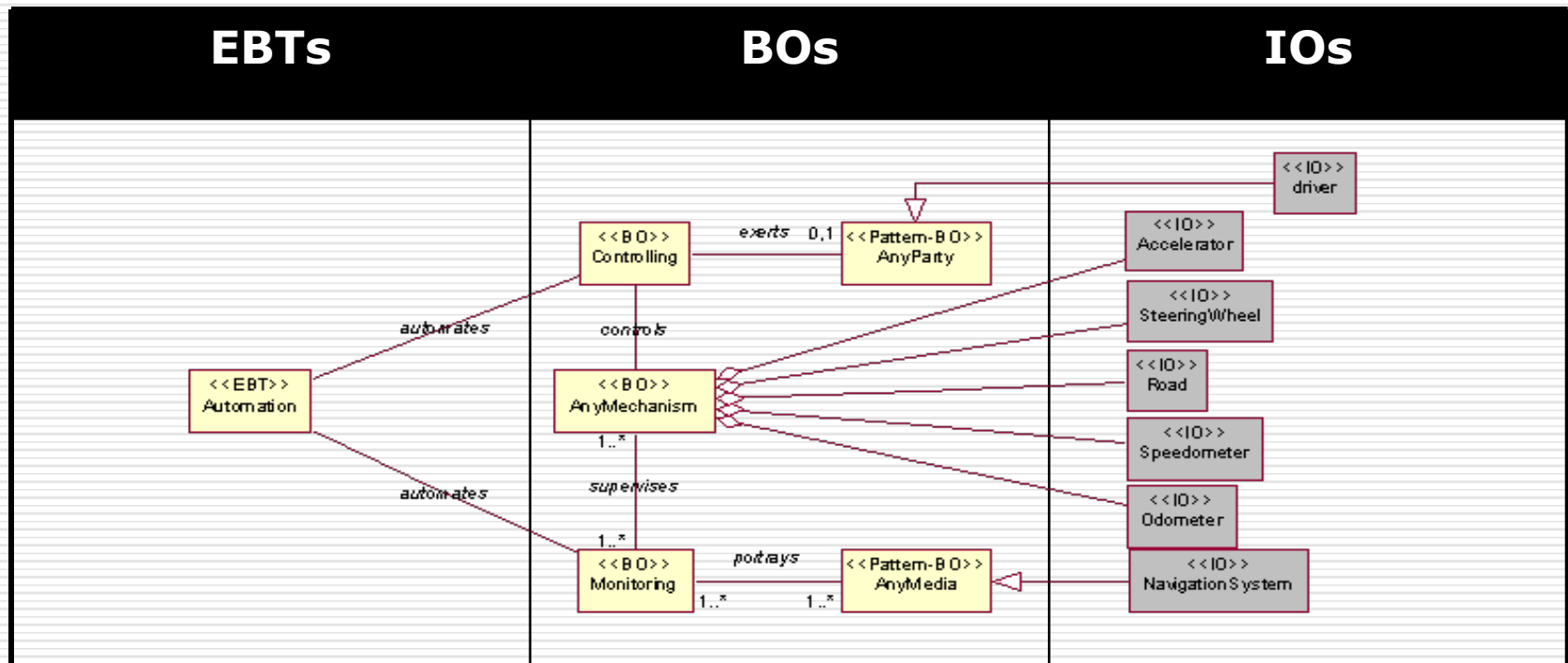
Class (Roles)	Responsibility
Automation (Automation Handler)	Describe the automation concept itself
Controlling (Controlling Descriptor)	Represents the controlling techniques aided by the Pattern
Monitoring (Monitoring Descriptor)	Specify the monitoring actions over particular mechanisms
AnyMechanism (Mechanism Descriptor)	Represents the abstract mechanism enhanced by the automation process
AnyMedia (Media)	Represents the media used to assist the monitoring process
AnyParty (Process Supervisor)	Supervise the automation process

Stable Automation Pattern Effects

- Pattern Consequences:
 - *Embody the Basis for the Automation Concept per se.*
 - *Handles the automation of more than one Mechanism.*
 - *Embody distinct controlling techniques.*
 - *Handles distinct Monitoring techniques.*
 - *Consider Different Media Types.*
 - *Adaptable for Required Application Areas.*
- Pattern Limitations:
 - *Lack of Pattern Representations.*
 - *No Industrial Objects to clarify pattern applicability.*

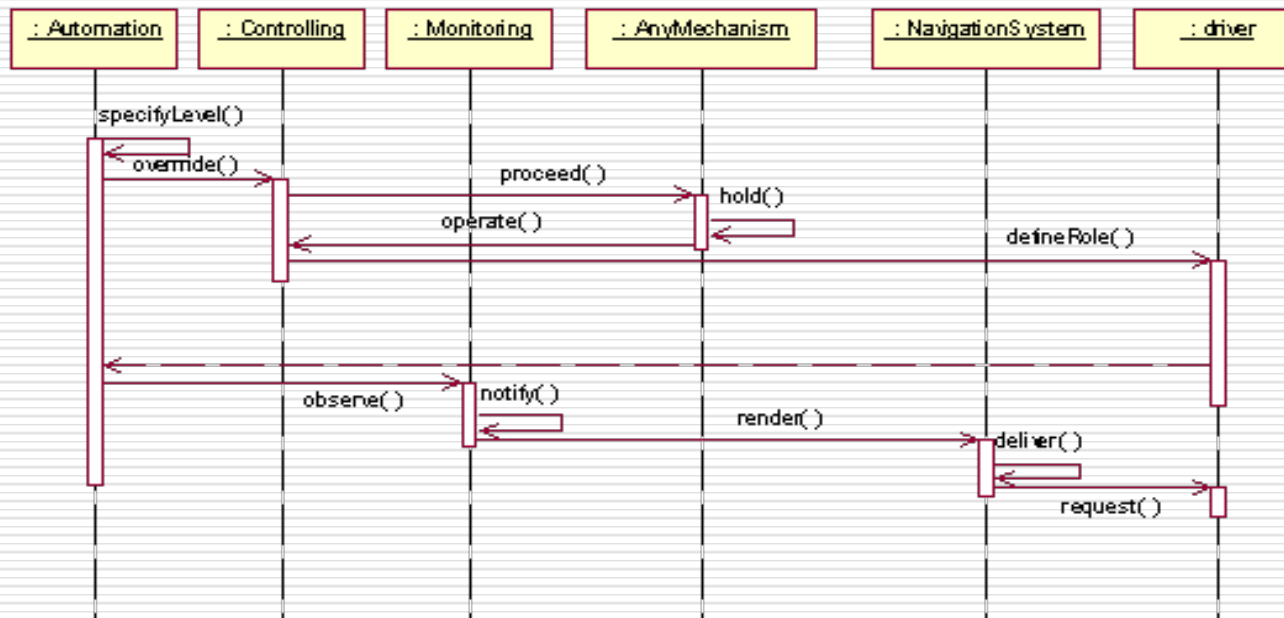
Stable Automation Pattern Applicability

Scenario One: Car Driving:



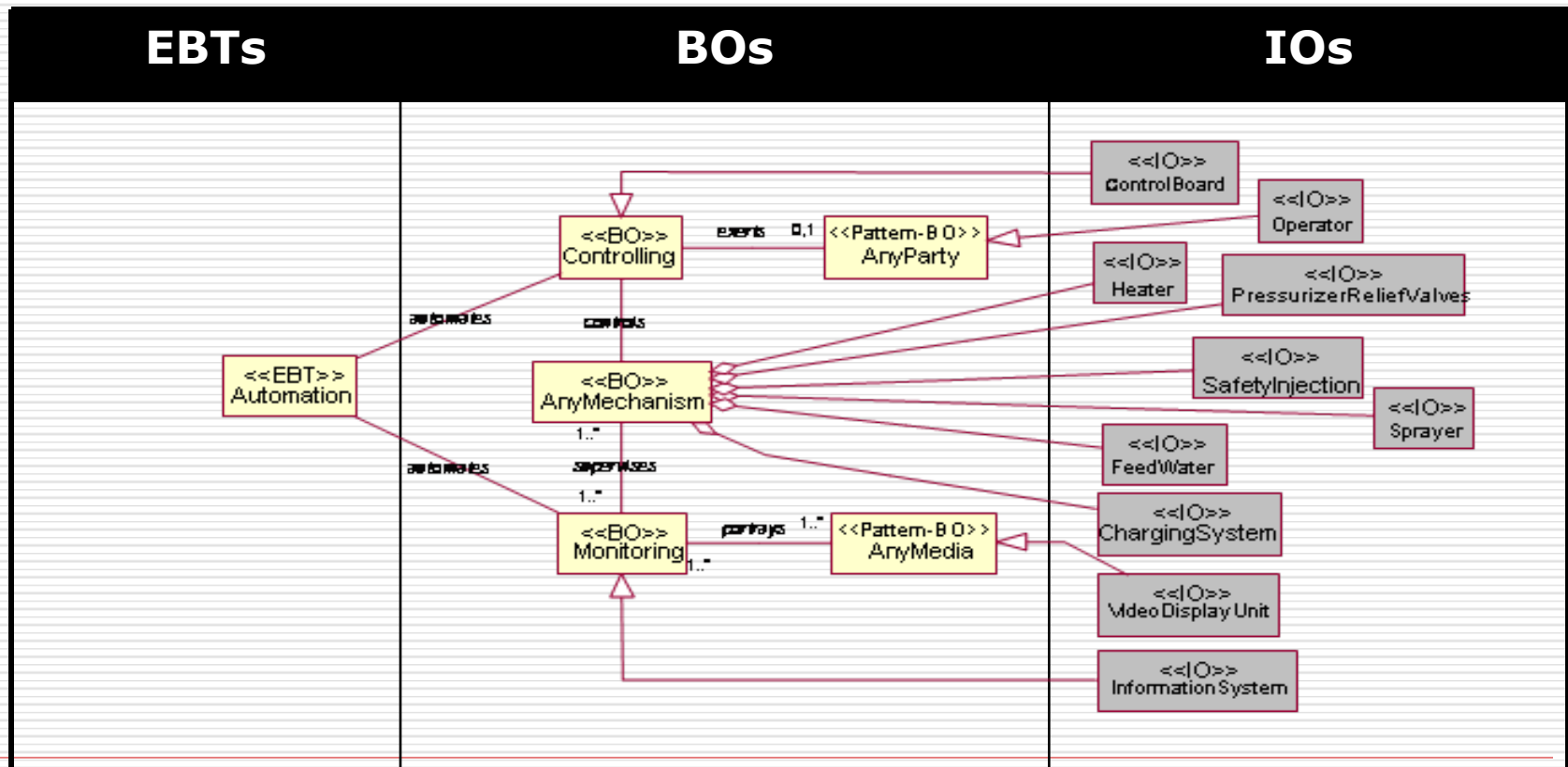
Stable Automation Pattern Applicability

Scenario One: Car Driving:



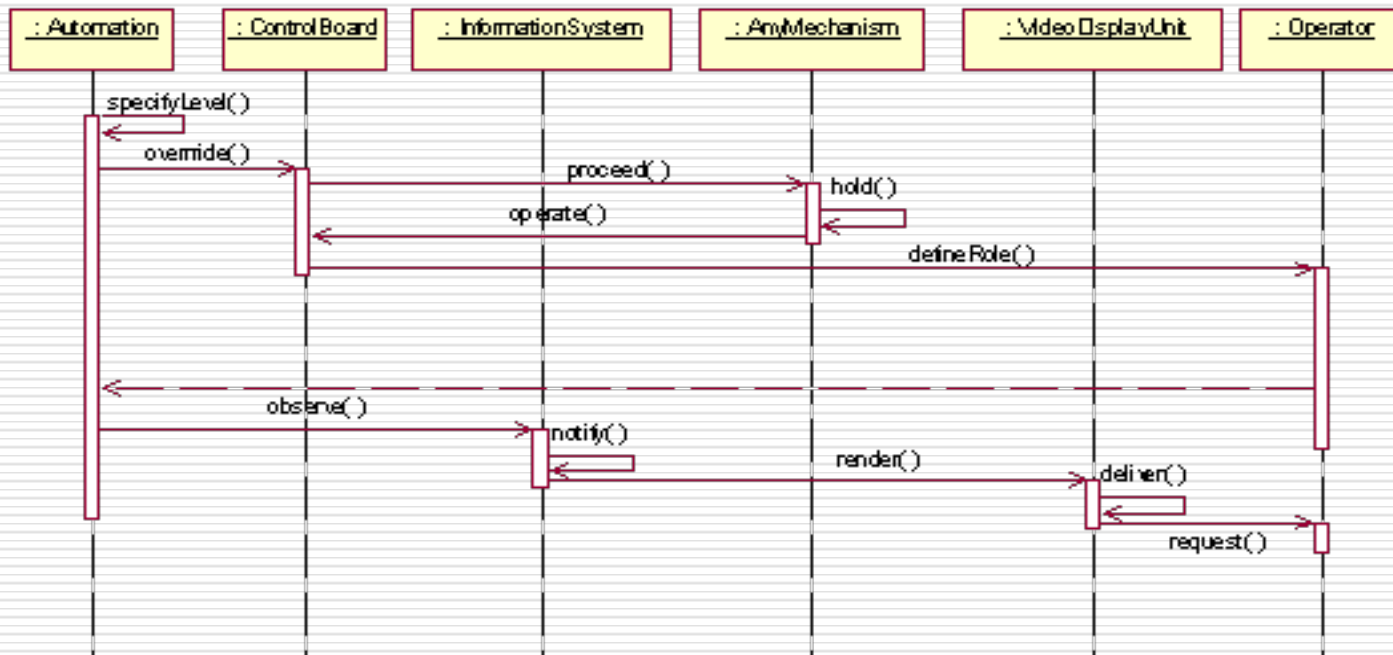
Stable Automation Pattern Applicability

Scenario Two: Power Plant:



Stable Automation Pattern Applicability

Scenario Two: Power Plant:



Stable Automation Pattern Conclusion

- The main objective of the work described in this paper is the utilization of the Software Stability concepts to come up with a general design that address the automation endured knowledge across dissimilar domains.
- The rationale behind this task was the identification and separation of the automation endured knowledge from its concrete application, which is highly bound to a specific context, to assure stability over time.
- Any change to the requirements will be handled by directly adapting automation's concrete application aspects, leaving untouched automation endured knowledge.

The End

Thank You

Questions?