

Applying and Extending the Event Refinement Structure Approach to Workflow Modelling

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Overview

- **Background**
 - ❑ Event Refinement Structure (ERS)
 - ❑ ERS Aims & Goals
 - ❑ ERS Patterns
- **Motivation**
 - ❑ Workflow Modelling Challenges
- **Case Study**
 - ❑ Requirements Overview
 - ❑ ERS Representation of the Fire Dispatch Workflow
- **Conclusion**
 - ❑ Conclusion
 - ❑ Future Work

Event Refinement Structure (ERS)

- Initially introduced by Butler¹
- Graphical notation based on Jackson Structure Diagrams (JSD)
- Main Goals of ERS
 - Explicit **control flow** of events
 - Explicit **refinement** relationships
 - **Structuring** refinement in Event-B

¹ Butler, Michael. "Decomposition structures for Event-B." *Integrated Formal Methods*. Springer Berlin Heidelberg, 2009

ERS Patterns

- **Semantics**

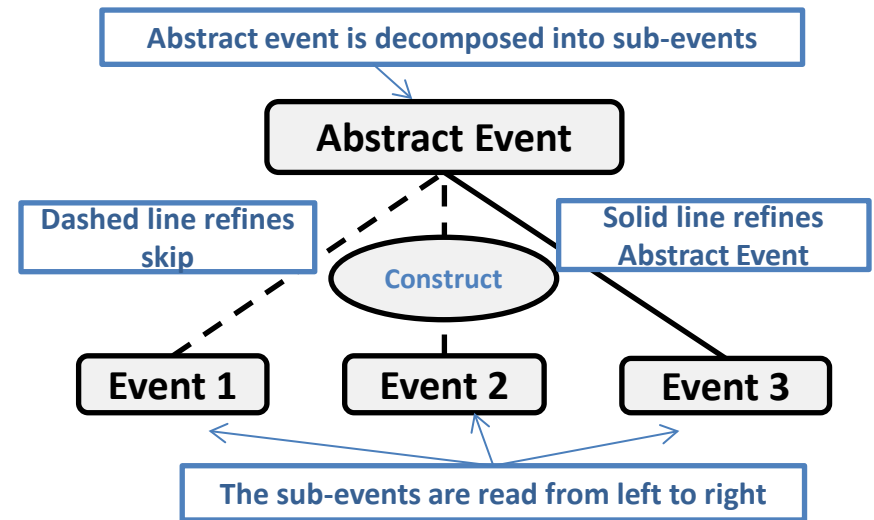
- Transforming ERS diagram into Event-B

- **Patterns**

- Sequence pattern
- Loop pattern
- Logical constructors (**and**, **or**, **xor**)
- Replicator patterns (**all**, **some**, **one**)

- **Constraints**

- **Single solid line** rule
- **Combination** of constructors at a **single refinement** is **not** allowed



Motivation

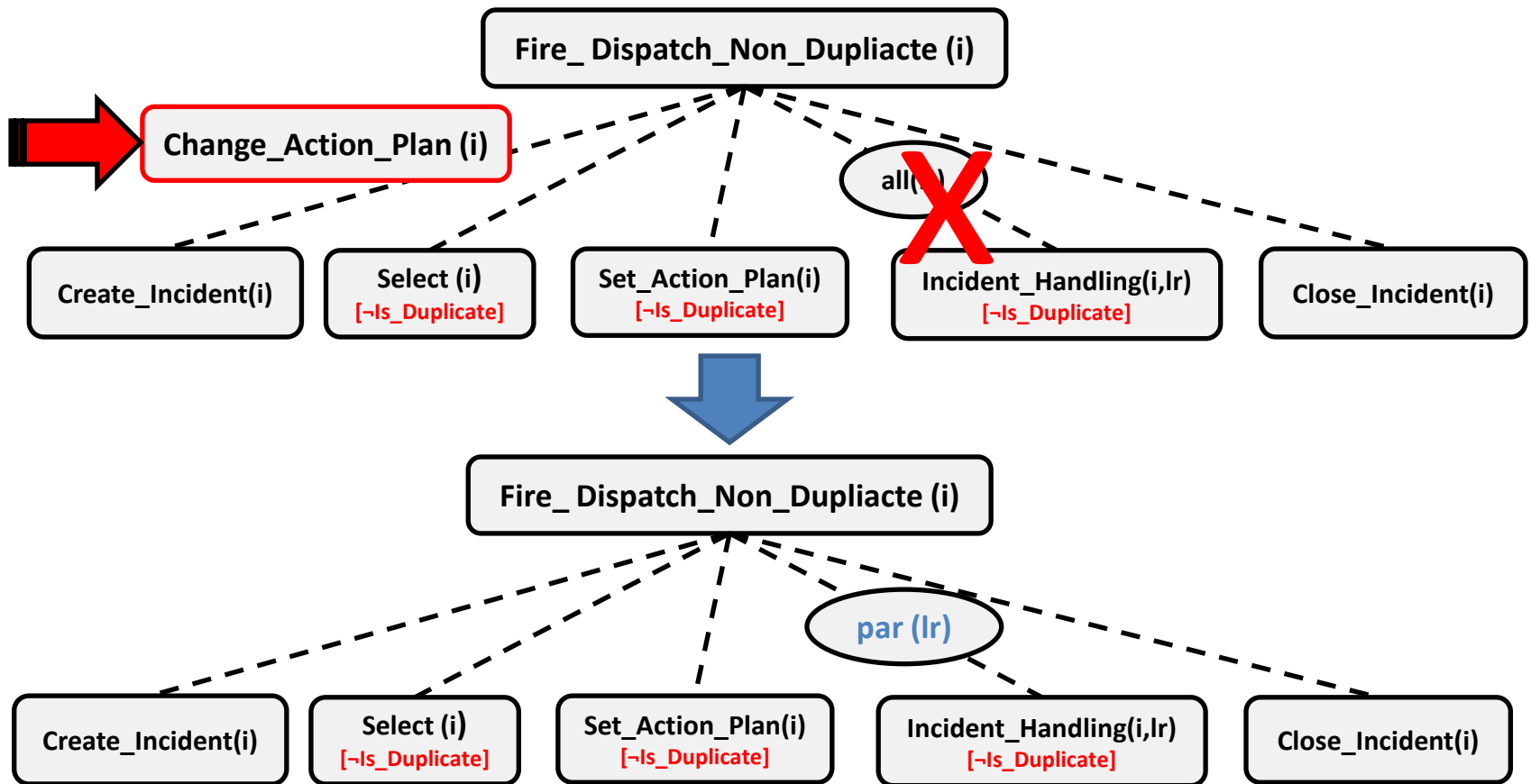
- **ERS**
 - ❑ **A Workflow Modelling Approach**
- **Workflow Challenges**
 - ❑ **Multiple Instances Representation**
 - ❑ **Hierarchical Decomposition**
 - ❑ **Support for Data Structures**

Fire Dispatch Requirements

- **Incident Information**
 - Type, Location, Priority Level
- **Incident Handling**
 - Action Plan, Resource Types, **Plan Change**
- **Resource Manipulation**
 - Resource Allocation, Reallocation
- **Incident Closure**
 - **Duplicate**, Non-Duplicate

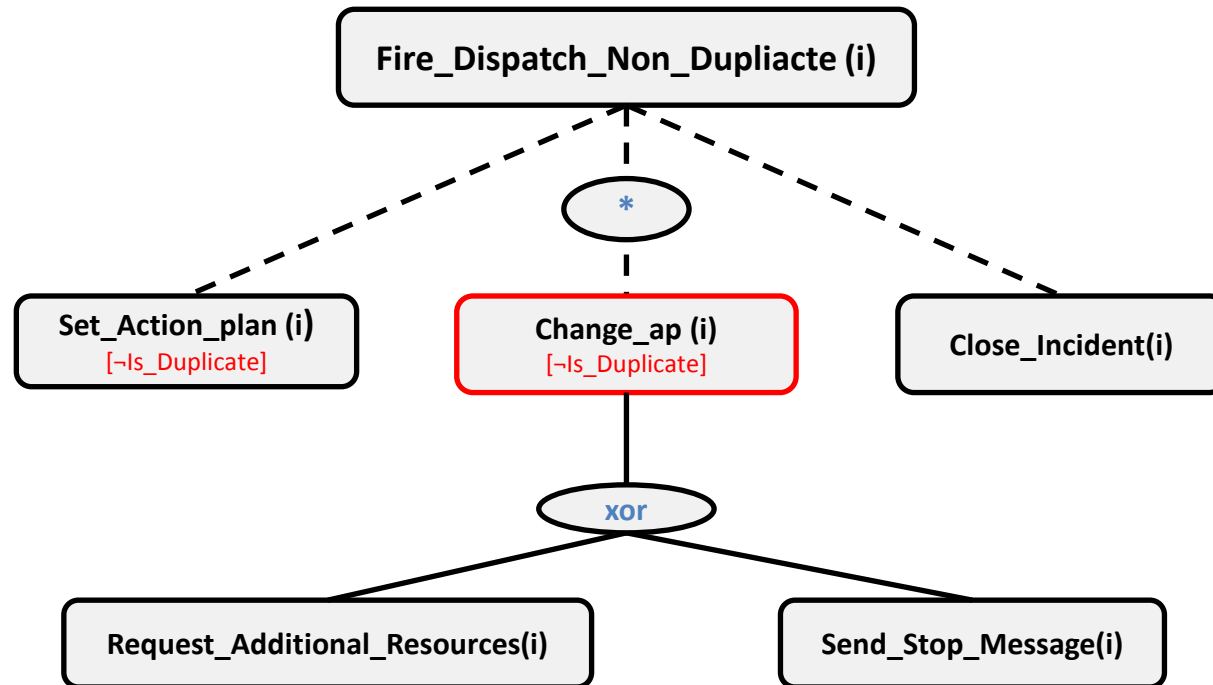


Fire Dispatch – Non Duplicate Case



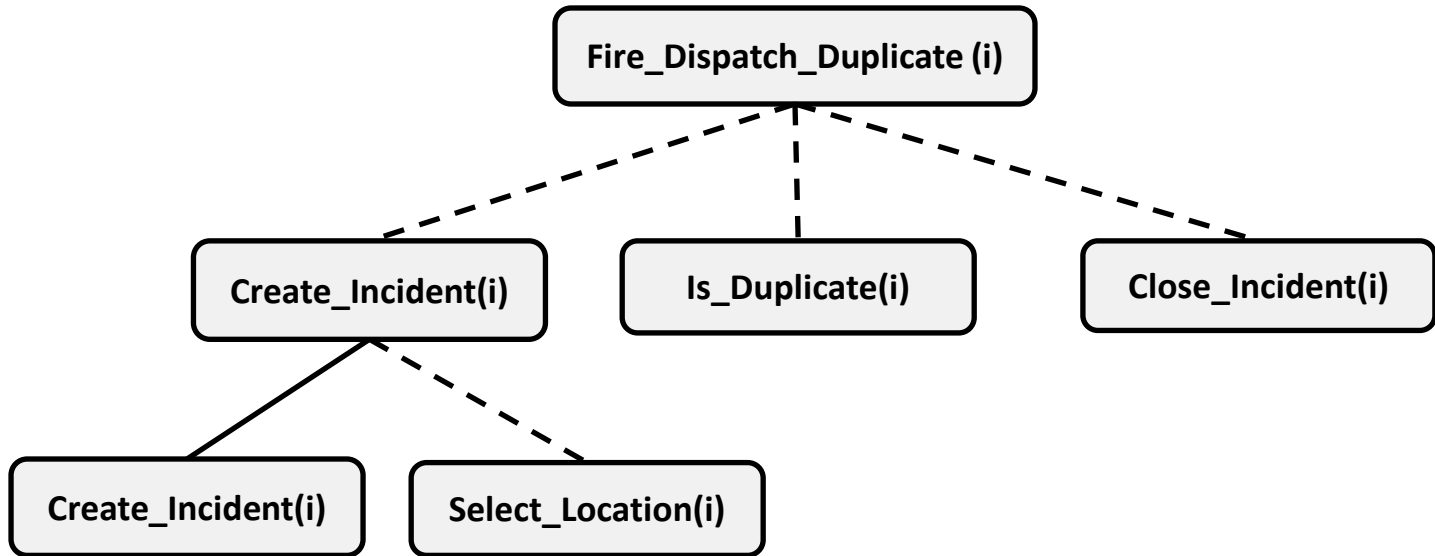
Fire Dispatch – Non Duplicate (2)

- Change Action Plan Sub-Diagram



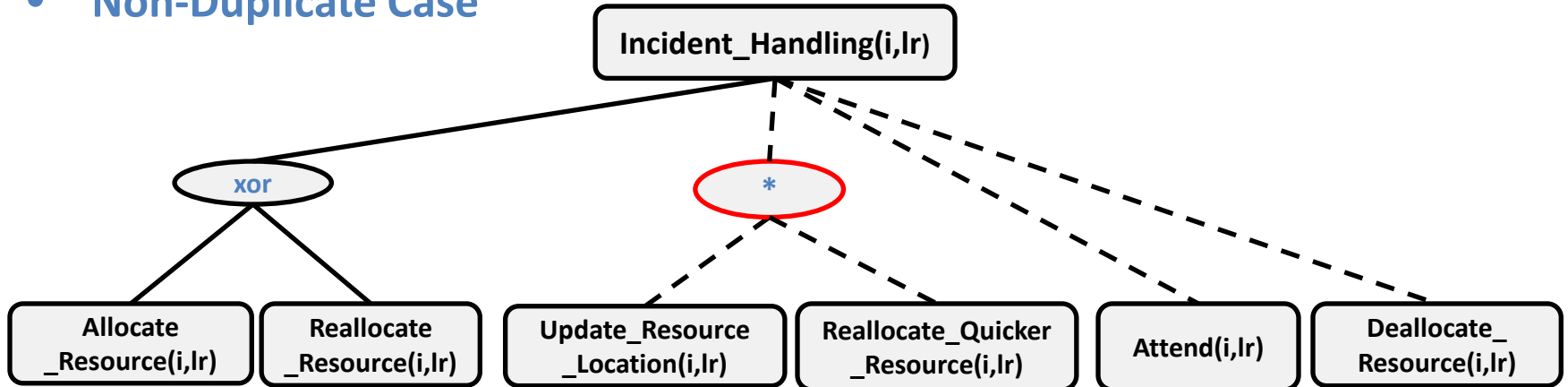
Fire Dispatch – Duplicate Case

- An incident should be **closed** if identified as **duplicate**

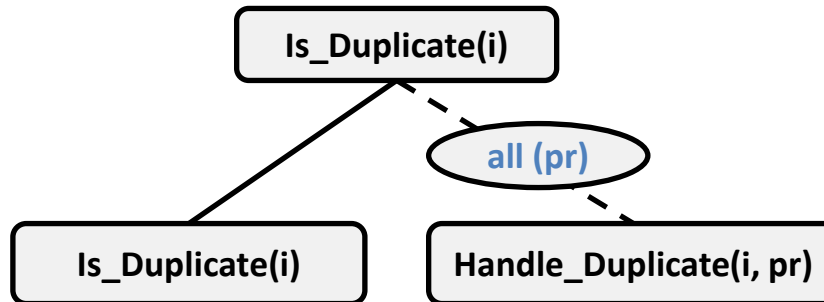


Introducing Physical Resources

- Non-Duplicate Case



- Duplicate Case



Conclusion & Future Work

- Use of a hierarchical decomposition approach for modelling a complex workflow
- Extending ERS to support unbounded replication
- **Future Work**
 - Support of new ERS extensions in the ERS (atomicity decomposition) plugin
 - **Evaluation** of ERS extensions in new case studies

Thank you.
Any questions?