



Extending CPN Tools with Ontologies to Support the Management of Context-Adaptive Business Processes

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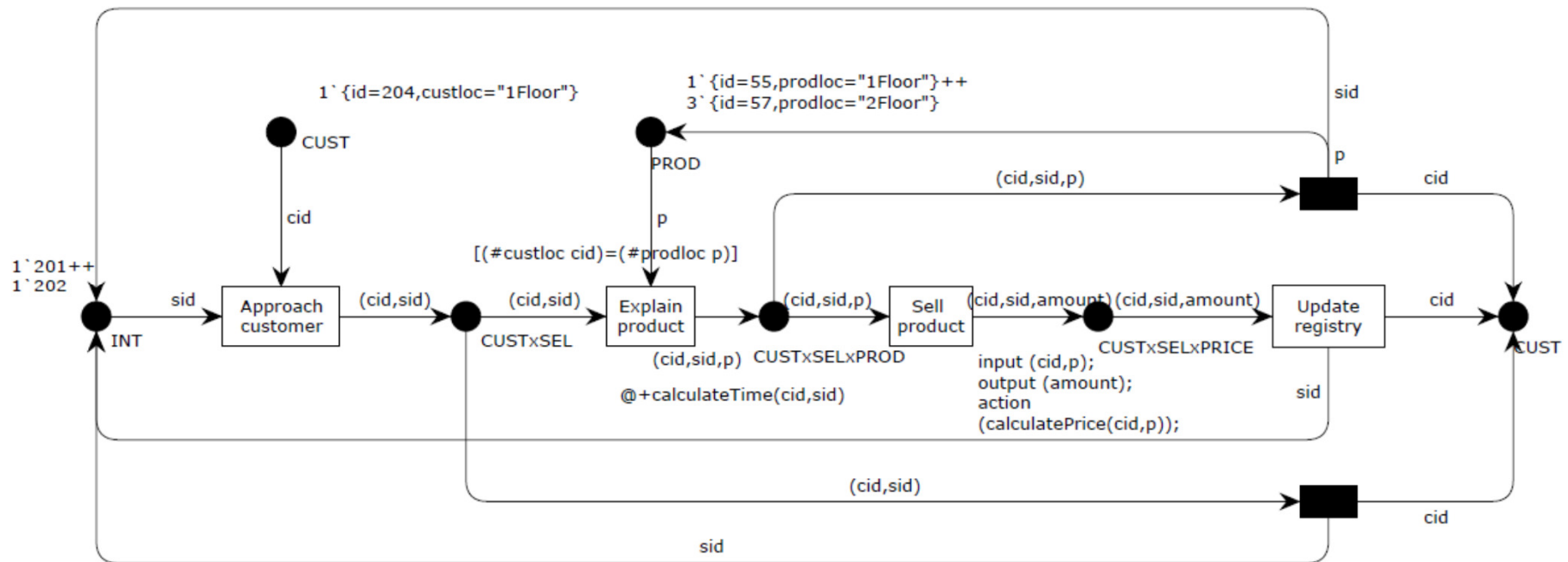


Agenda

- Motivation
- Context-Adaptive Business Processes
- Tool Support
- Conclusions and Further Work

Motivation

- Colored Petri Nets (CPN) - provide many benefits for managing business environments:
 - powerful analysis techniques, simulation, graphical notation



Motivation

- Business processes operate more and more in dynamic environments
 - The execution context is continuously changing
- Fitness between business process modeling and its execution context is necessary
 - Process execution runs must adapt to their context

Motivation

- Data limitations:
 - Data types and variables are internally defined in the nets
 - Data is strictly local with respect of any transition
 - No data persistency is provided
- Context data is continuously changing:
 - Current CPN formalism not enough

Context-Adaptive Business Processes

- Ontologies to model context and manage it at runtime

The screenshot displays an ontology editor interface with several components:

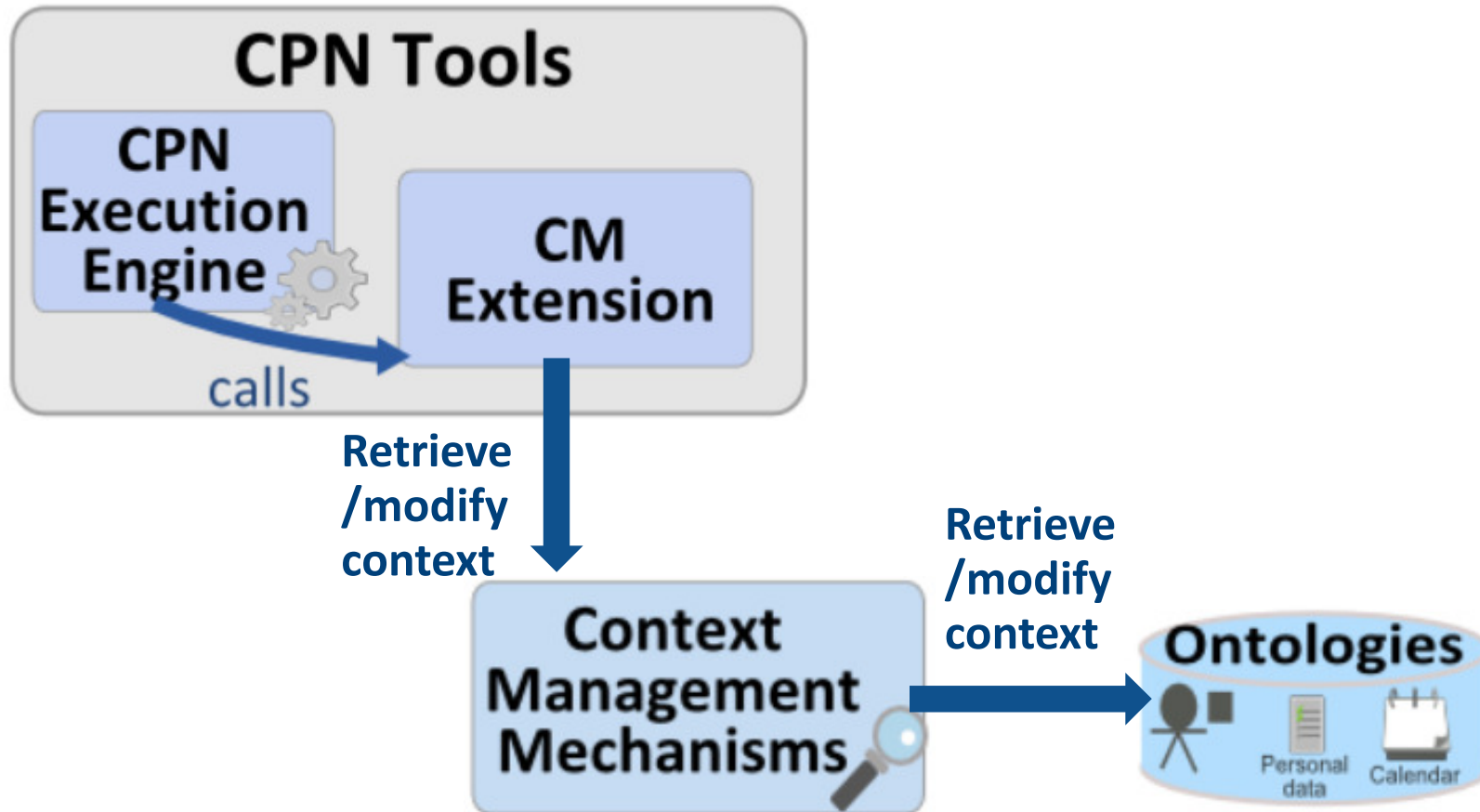
- Metadata(SellDepartment)**: The main project context.
- SUBCLASS EXPLORER**: Shows the ontology hierarchy for Project: BPME. The hierarchy includes: owl:Thing, Brand, Customer, Employee (Seller), Location, ProductCategory (ProductType), and Shop. The **ProductType** class is selected.
- INSTANCE BROWSER (top)**: For Class: ProductType. It shows asserted instances: AirConditioner_Lex125, Dell_latitude_e6410, and Fan_23.
- INSTANCE BROWSER (middle)**: For Class: Product. It shows asserted instances: AirConditioner_Lex125_6, Dell_latitude_e6410_16, Fan_23_26, and MotorolaG_15.
- INDIVIDUAL EDITOR for AirConditioner_Lex125_6 (instance of Product)**: Shows property values for this instance:

Property	Value	Lang
maxTime	30	
price	650	
id	AirConditioner_Lex125_6	
location	AIRCODEpartment	
productType	AirConditioner_Lex125	
inPromotion	true	
name	AirConditioner_Lex1	
barcode	ikeifcr574526ae	

Context-Adaptive Business Processes

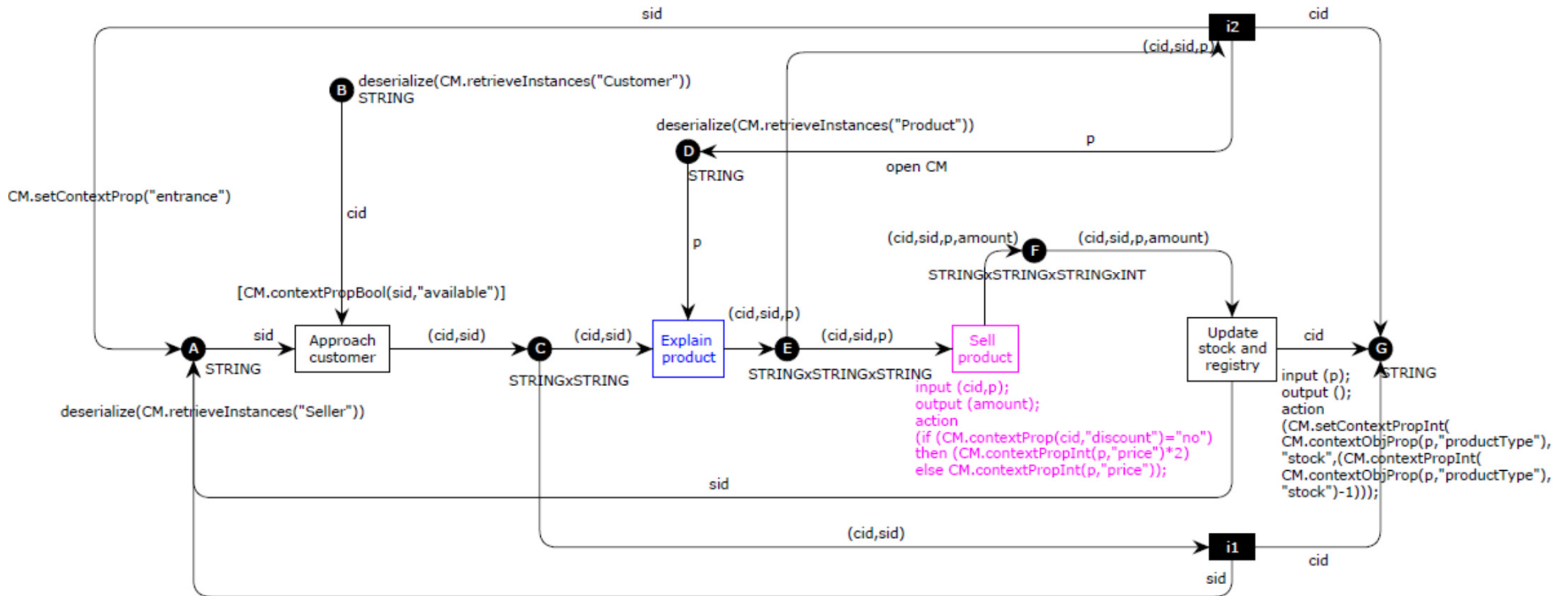
- CPN extension to refer context properties:
 - We identify all the CPN constructs where context can be used: guards, actions, arc expressions, initial markings, etc.
 - We extend these constructs to be able to add context references, e.g.:
 - Customer.instances
 - customerID.location
 - Etc.

Tool Support

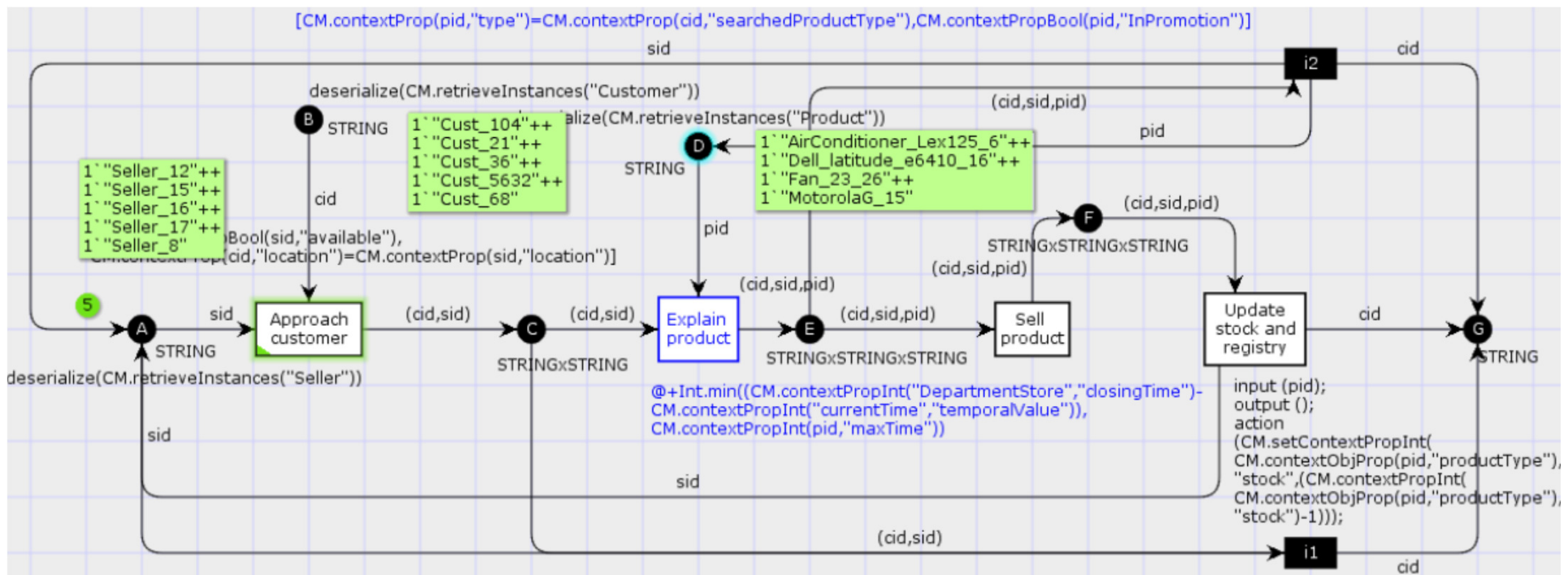


Tool Support

```
[CM.contextProp(cid,"location")=CM.contextProp(p,"location"),CM.contextPropBool(p,"InPromotion"),CM.contextPropInt(p,"price")>20]
@+Int.min((CM.contextPropInt("DepartmentStore","closingTime")-CM.contextPropInt("currentTime","temporalValue")),CM.contextPropInt(p,"maxTime"))
```



Tool Support



Conclusions

- CPN extension that supports the modeling, analysis and execution of context-adaptive business processes
- Enables the use of CPN in dynamic environments
- The context of the system can be semantically represented and properly managed at runtime
- The data can be reused in the Petri nets of the system with minimal effort
- Data and behavior are treated as separate concerns:
 - Facilitates system design and maintenance

Further Work

- Improve user-friendliness of the context references
- Hide ontology-specific technological details
- Investigate the new requirements for performing a state-space analysis in the created extension



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