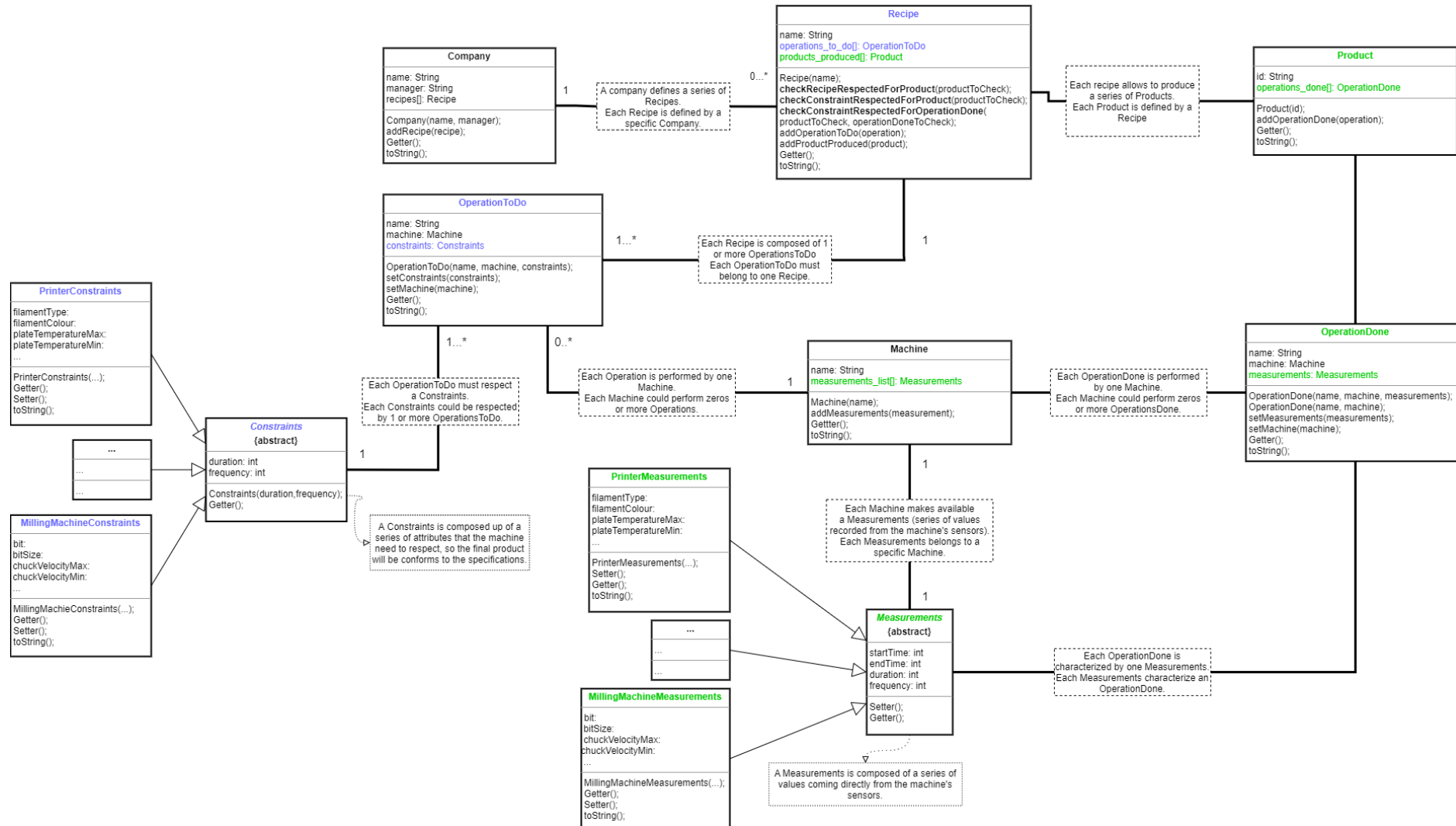


Implementing Hotmoka Blockchain for Certification of Industrial Manufacturing Processes

Mario Libro

Base diagram



Output Structure

- Explanation of the output structure, by number of row:
 - 1: Name of the Recipe
 - 2: List of operations to be performed and machines to be used, as specified by the recipe
 - 3-6: Name of the product, with its respective satisfiability check
 - 4-5: List of operations performed, and machines used to produce the product with its respective constraint's satisfiability check

```
1  recipeName:  
2  [(OperationToDo1, inMachine), (OperationToDo2,inMachine), ...]  
3      productName: [recipe_respected|constraint_respected]->[V or X|V or X]  
4          (OperationDone, inMachine)->[V or X]  
5          ...  
6          ...
```

Real Output example

- Example of a real output extracted from the file “*output.pdf*”, more examples available over there

```
recipe1: [(Print,Printer)(Engrave,MillingMachine)(Drill,MillingMachine)]
product1_respected: [recipe_respected|constraints_respected]->[V|V]
  (Print,Printer)->[V]
  (Engrave,MillingMachine)->[V]
  (Drill,MillingMachine)->[V]

product2_wrong_order: [recipe_respected|constraints_respected]->[X|X]
  (Engrave,MillingMachine)->[X]
  (Print,Printer)->[X]
  (Drill,MillingMachine)->[V]
```

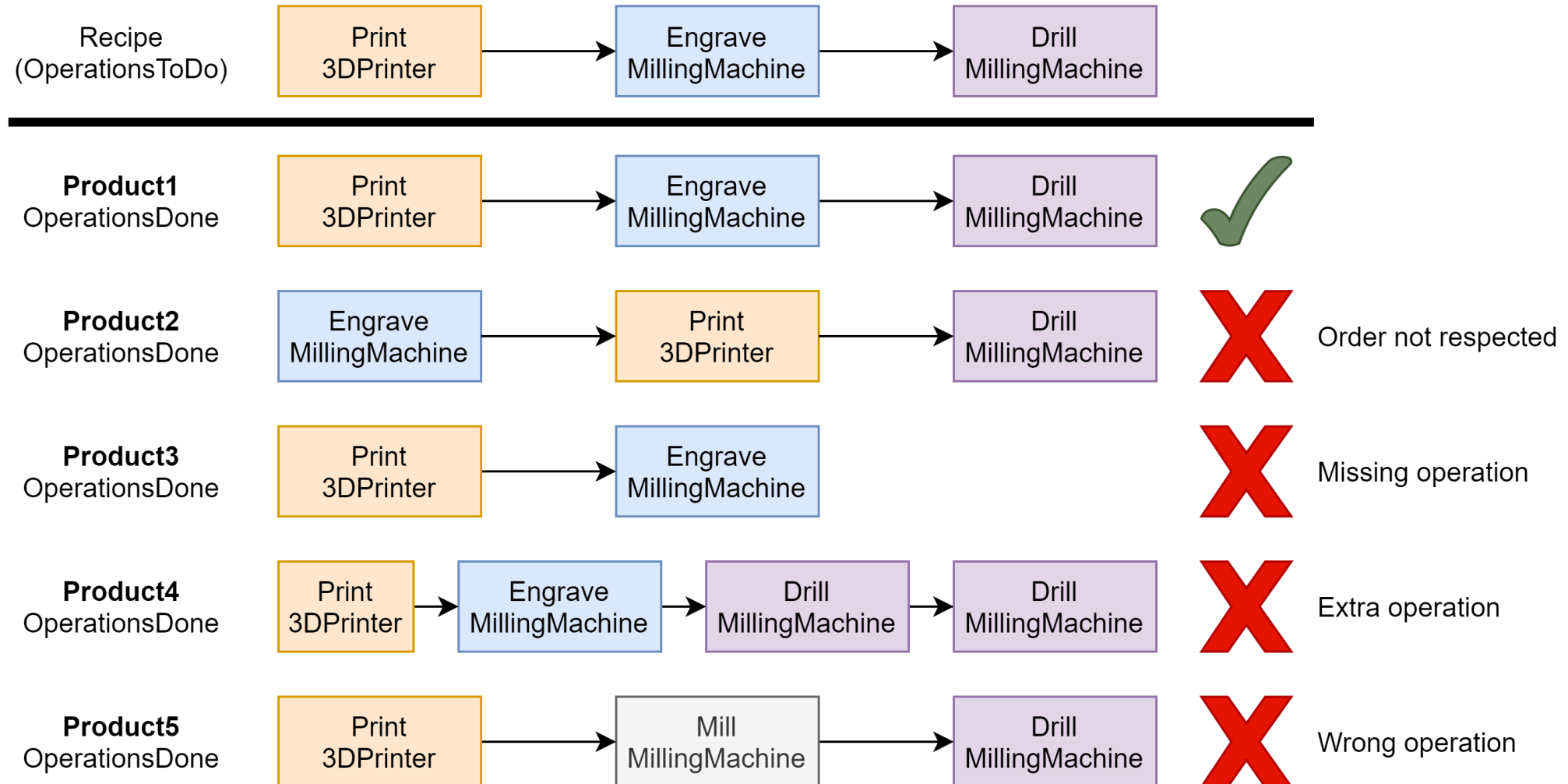
Information available in Output

- Name of the **manufacturing recipe**
- List of couples [(OperationToDo, Machine)]
 - represents the **list of operations to be performed** on specific machinery, as detailed in a manufacturing recipe
- List of **products produced** based on a specific recipe
- For each product produced:
 - **recipe_respected**: indicates whether a specific product correctly followed the sequence and machines prescribed by the list of **OperationsToDo** in the manufacturing recipe
 - **constraints_respected**: indicates whether the **OperationsDone** for a specific product adhered to the constraints outlined in the manufacturing recipe (false if at least one OperationDone doesn't respect its constraints, or the recipe is not respected)

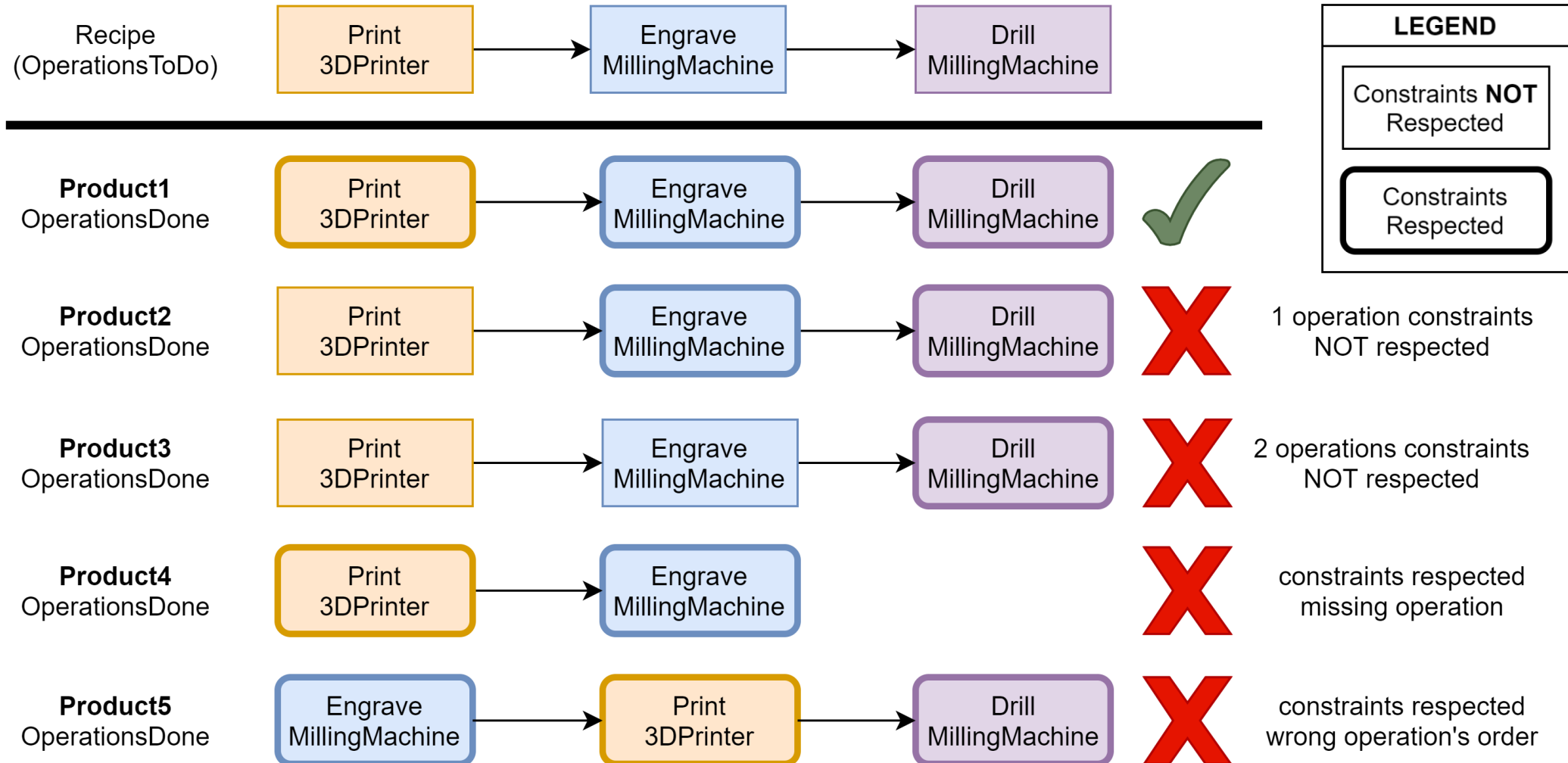
Information available in Output

- For each product produced:
 - List of couples [(OperationDone, Machine)]: indicates the list of **OperationsDone** performed in a specific machinery
- For each couple [(OperationDone, Machine)]:
 - **opdone_constraint_respected**: indicates whether a specific OperationDone has adhered to its corresponding constraints outlined in the manufacturing recipe

Attribute: recipe_respected



Attribute: recipe_constraint_respected



Attribute: opdone_constraint_respected

