Concept Location (SB5-MAI)

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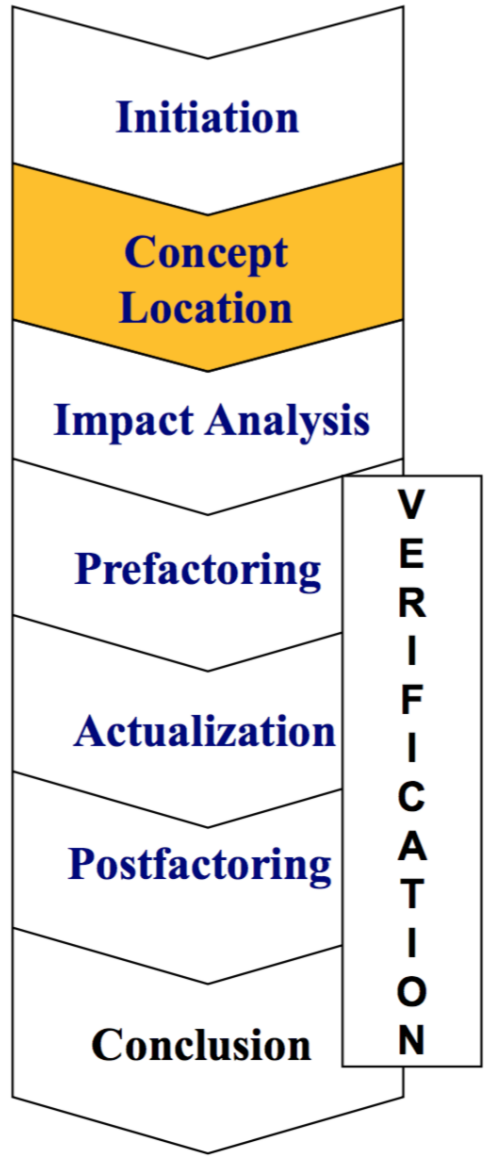
Concept Location

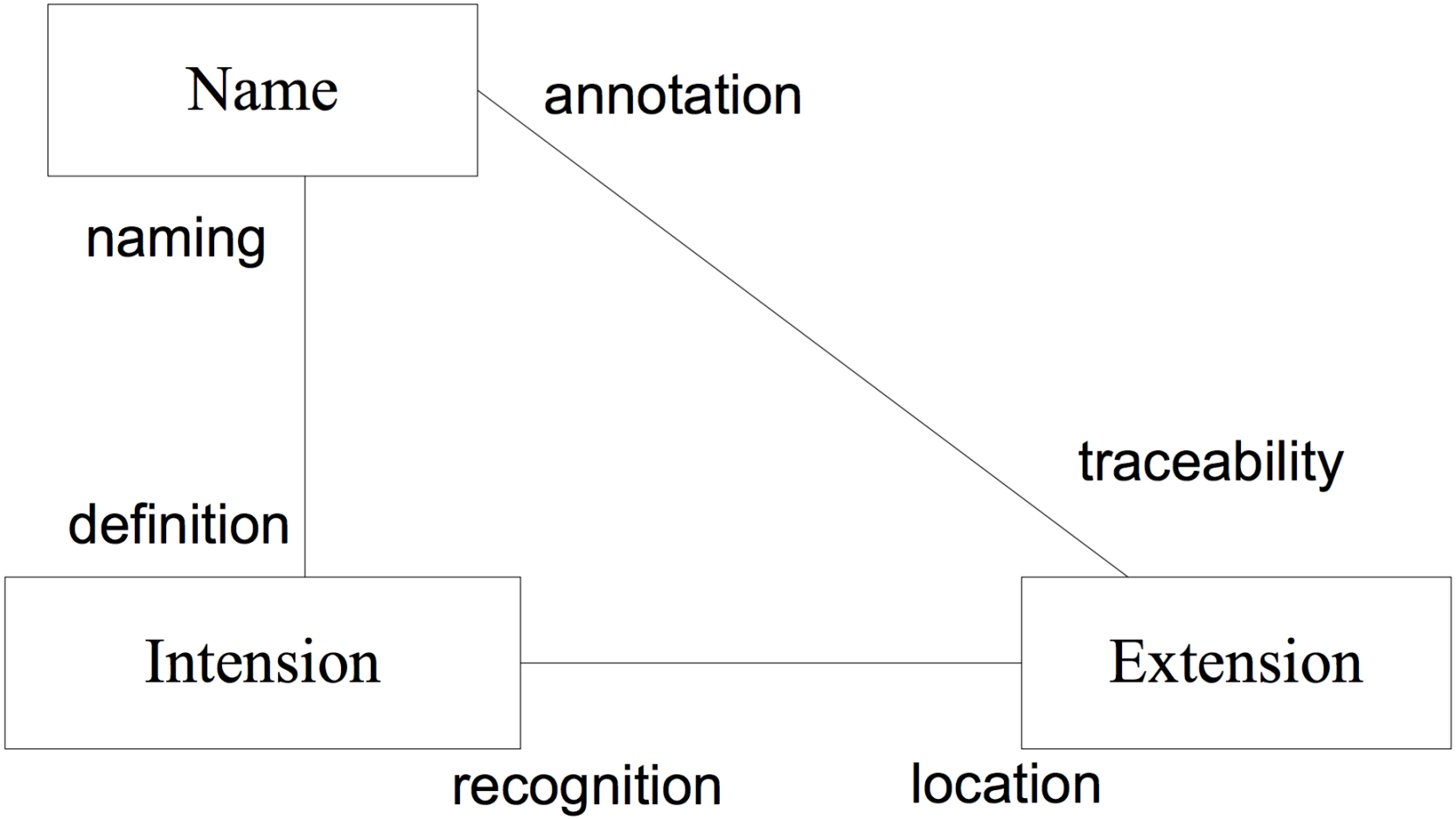
- Concept location finds code snippet where a change is to be made
- Change requests are most often formulated in terms of domain concepts
- **Example:** “Correct error that arises when trying to paste a text”



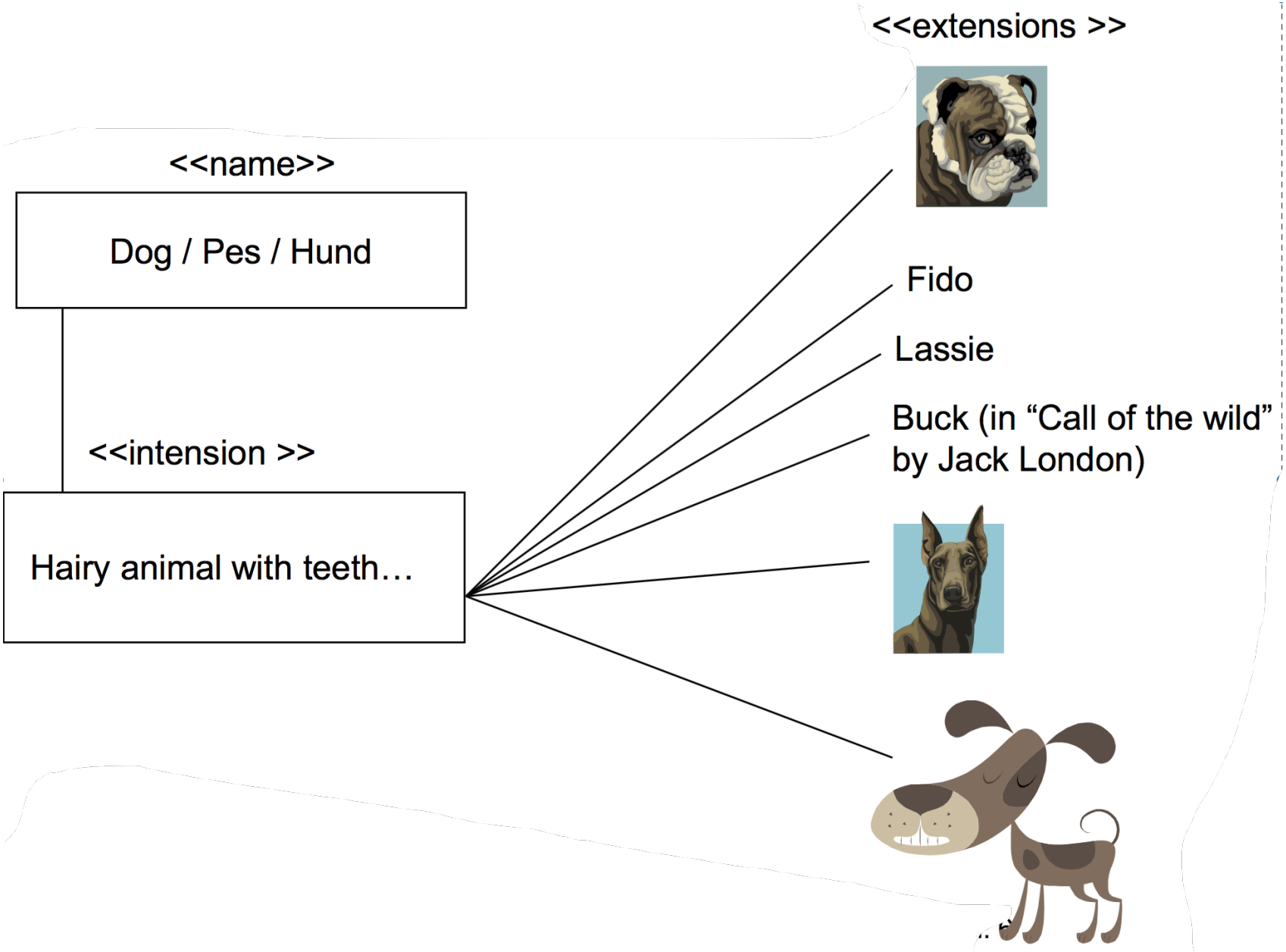
Partial Code comprehension

- **Large programs** cannot be completely comprehended:
  - minimum essential understanding
  - use an as-needed strategy
  - understand how certain specific concepts are reflected in the code
- **Analogy:** visiting a large city

Concept Triangle



Concept Triangle Example



Concept Location Example

Change Request: Modify the export feature of JHowDraw to automatically include a simple watermark text in the drawings being exported. Similar functionality is commonly found, for instance, in trial or demo versions of applications. The watermark should be included uniformly for all possible export formats.

Concepts: Export, Drawing, Text, Format

Concept Location Methodologies

- Human knowledge
- Traceability tools
- Dynamic search (execution traces)
- Static search: dependency search, pattern matching and information retrieval techniques

GREP Search Technique

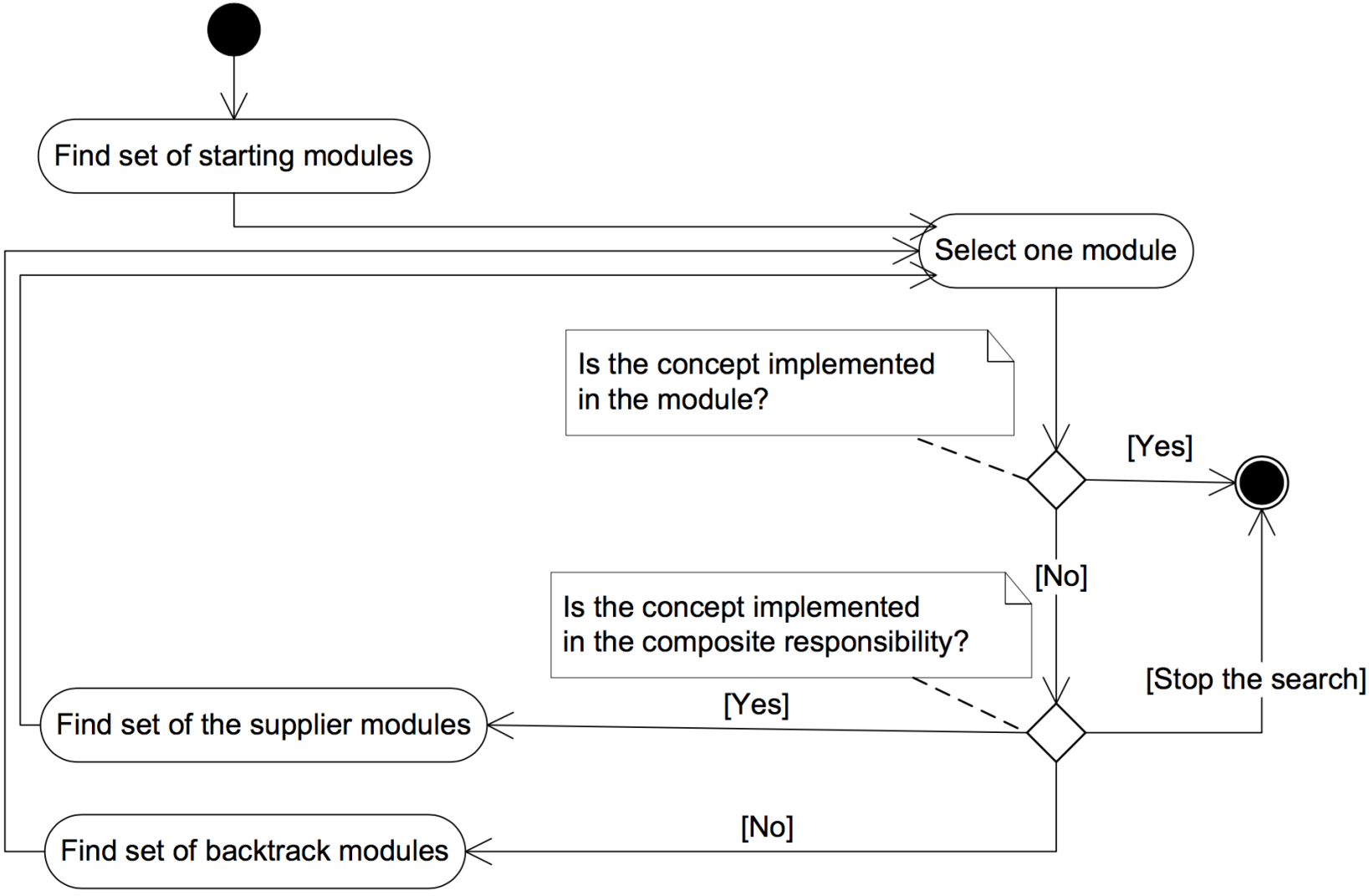
- GREP is an acronym for ”global regular expression print”.
- GREP prints out the lines that contain a match for a regular expression.
- Programmer iteratively formulates search query and then investigates the results.

Dependency Search Technique

- **Uses Class Dependency Graphs** (CDG)
  - extracted form the existing code
- **Local functionality**
  - consists of concepts that are actually implemented in the module and are not delegated to others
- **Composite functionality**
  - as the complete functionality of a module combined with all its supporting modules

- Determined by reading code and documentation

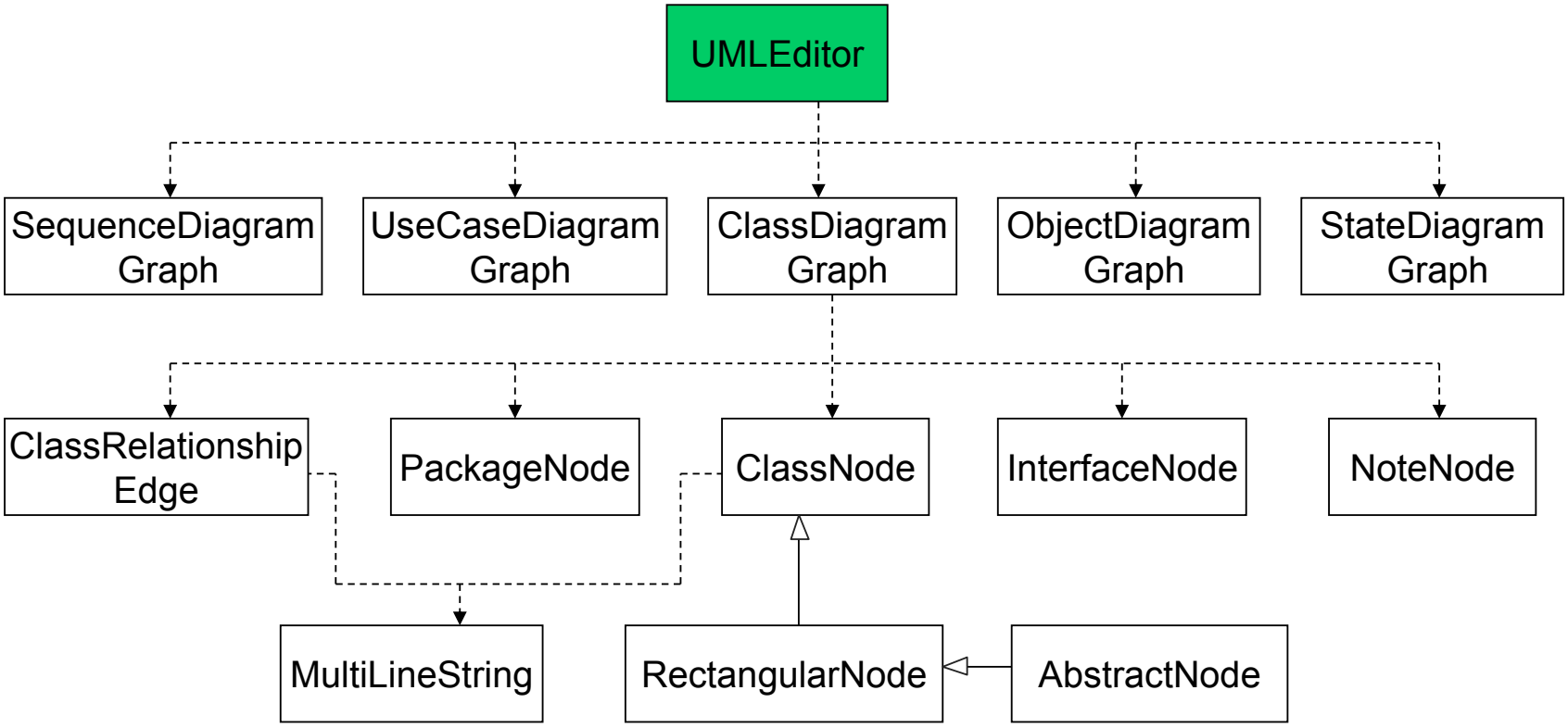
Dependency search



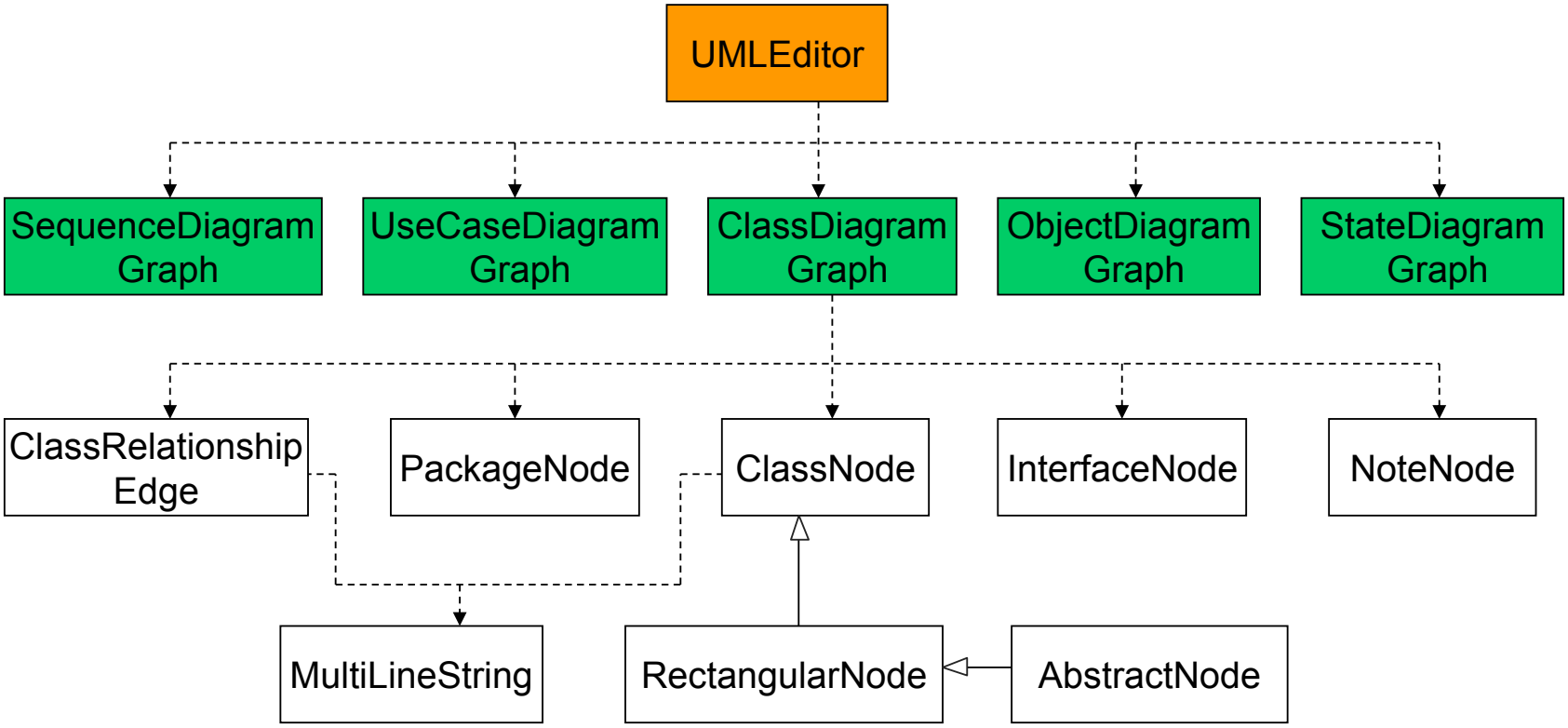
Status of components (marks)

Blank	The class was never inspected and is not scheduled for an inspection.
Propagating	The programmers inspected the class and found that its composite responsibility contains the concept
Unchanged	The programmers inspected the class and found that its composite responsibility does not contain the concept
Next	The class is scheduled for inspection

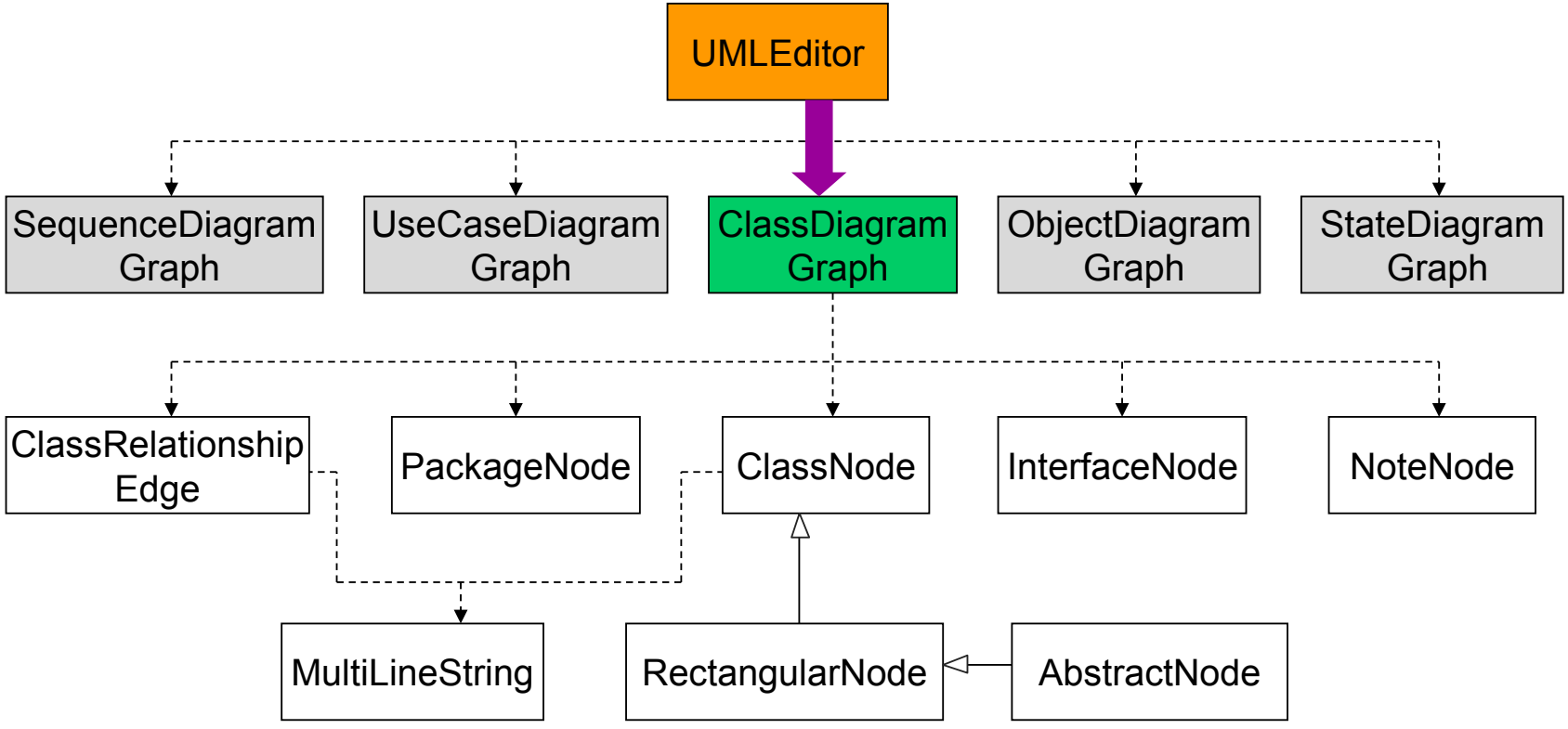
Locating Figure Properties: Start



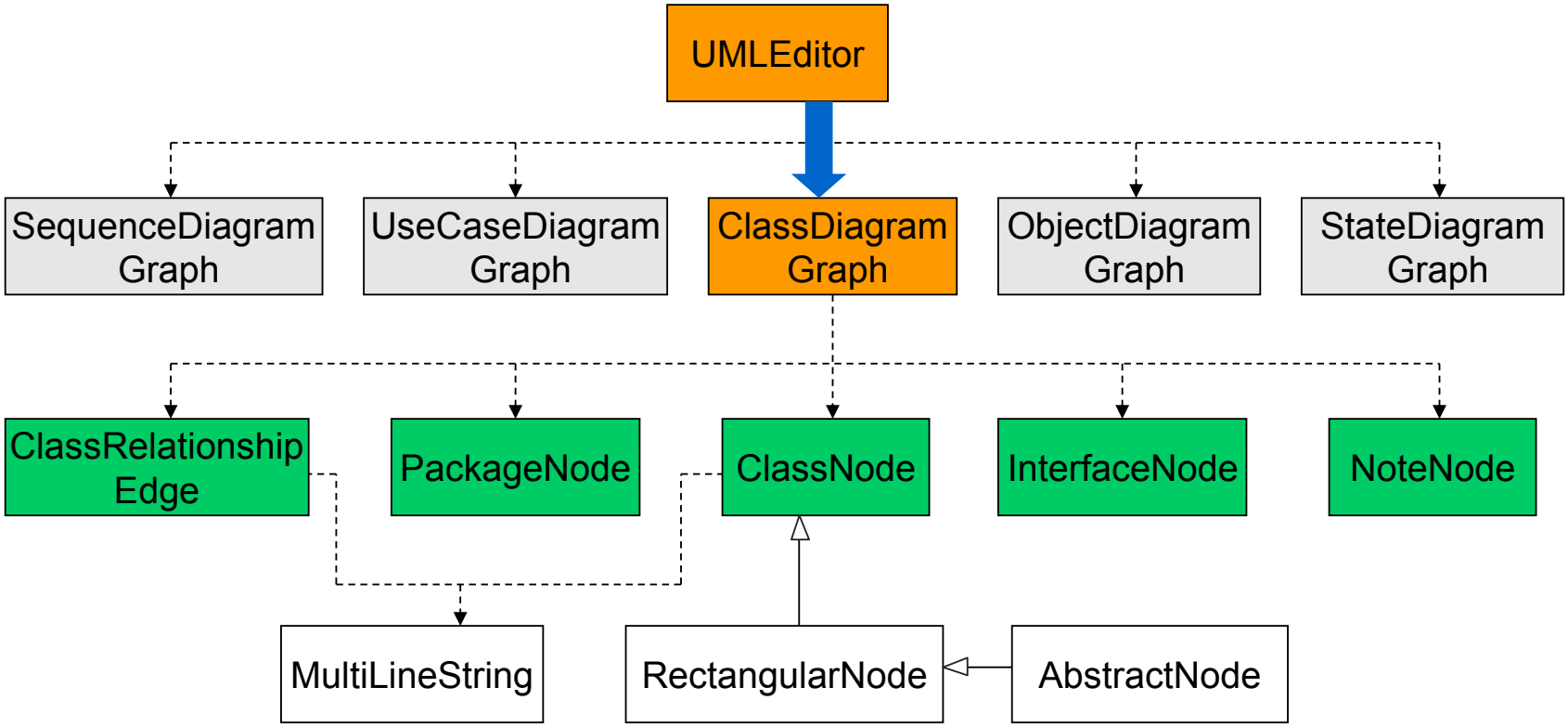
Classes to inspect



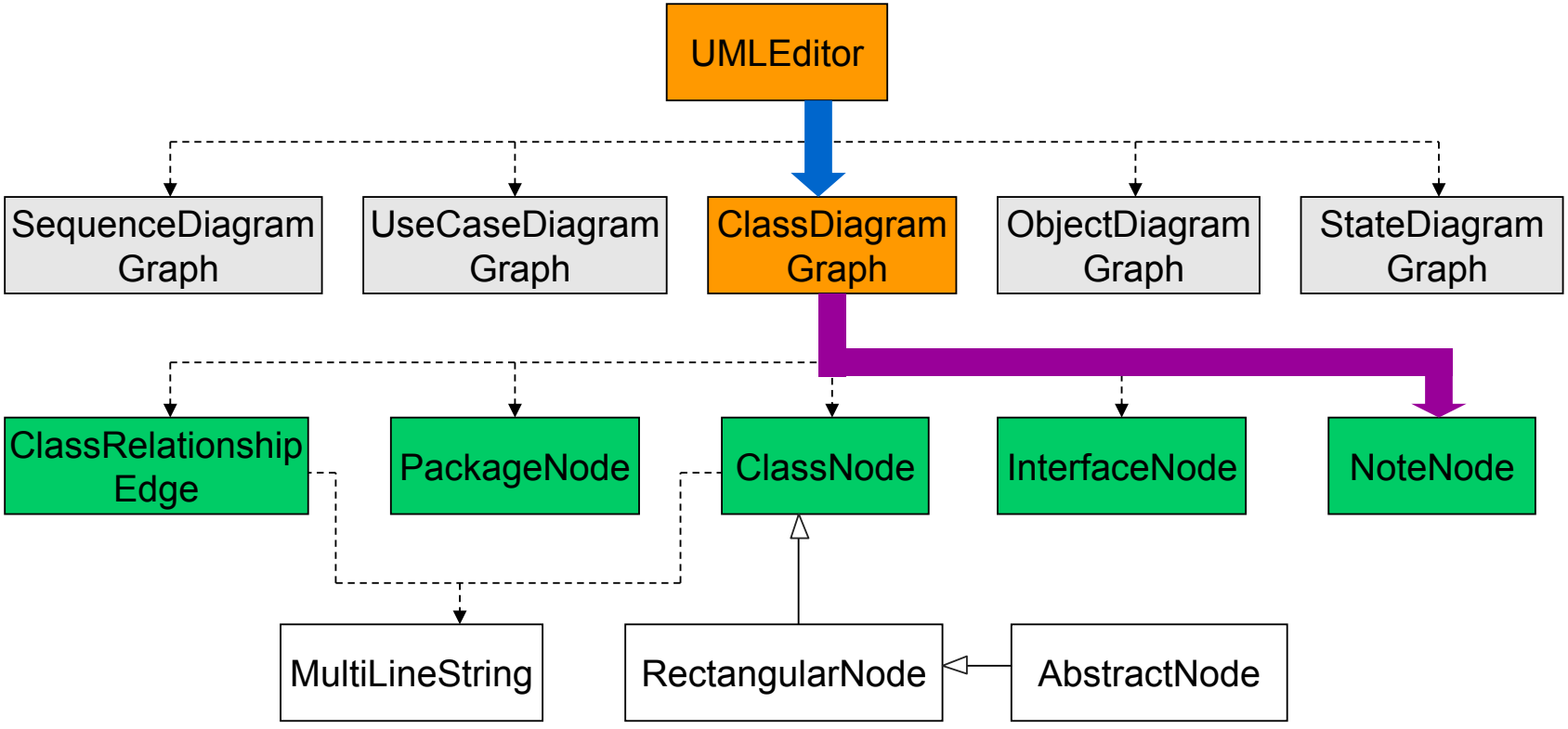
Most likely supplier



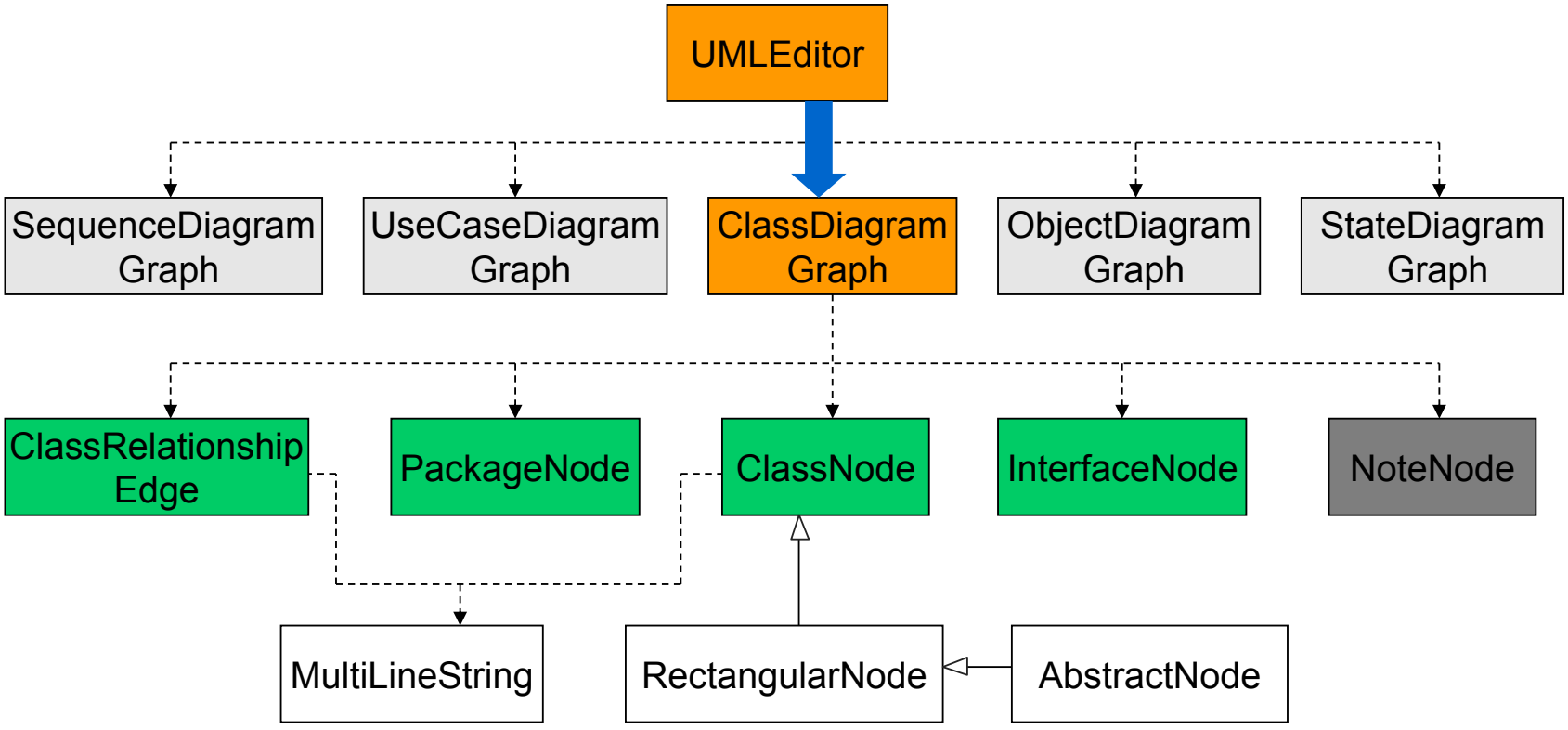
Next classes to inspect



Wrong way


UMLEditor
SequenceDiagram Graph
UseCaseDiagram Graph
ClassDiagram Graph
ObjectDiagram Graph
StateDiagram Graph
ClassRelationship Edge
PackageNode
ClassNode
InterfaceNode
NoteNode
MultiLineString
RectangularNode
AbstractNode

Backtrack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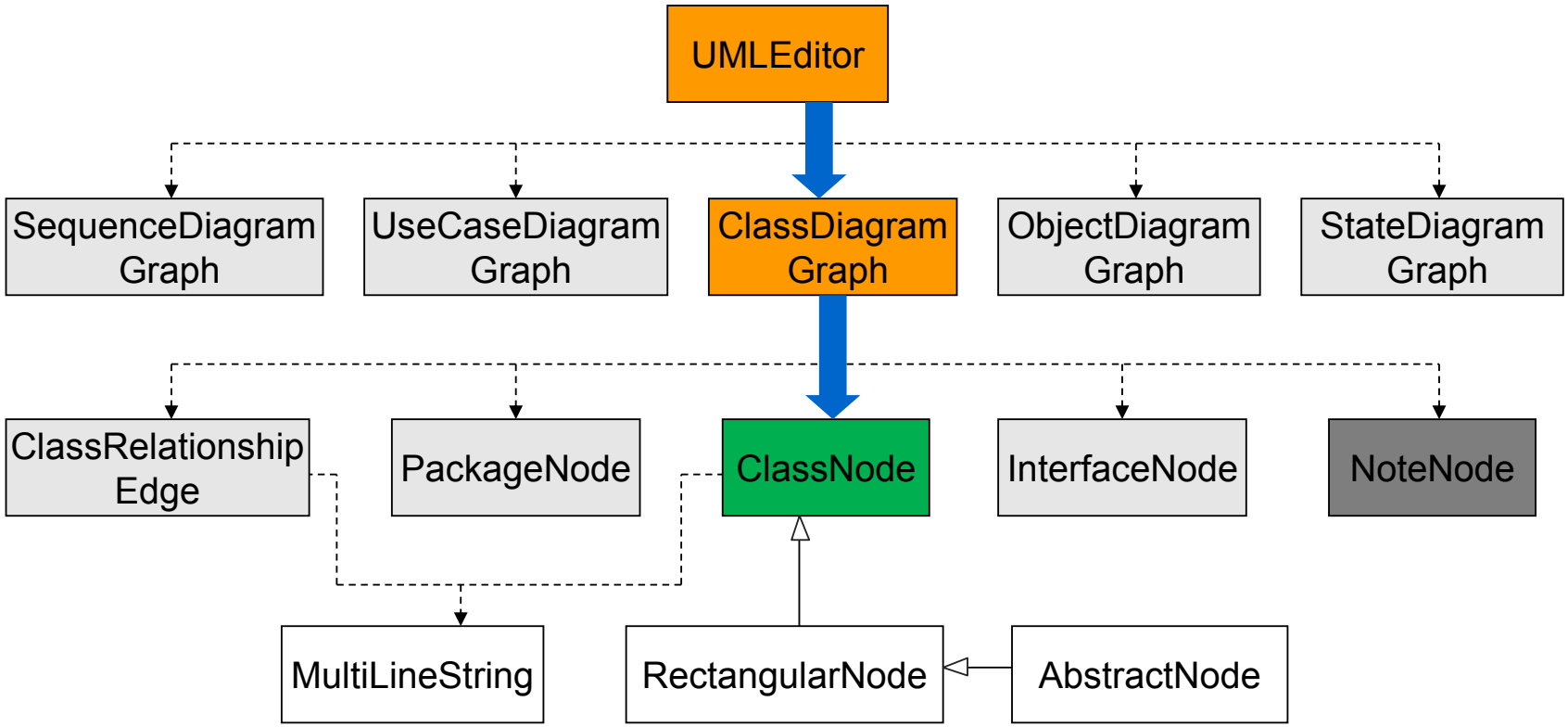
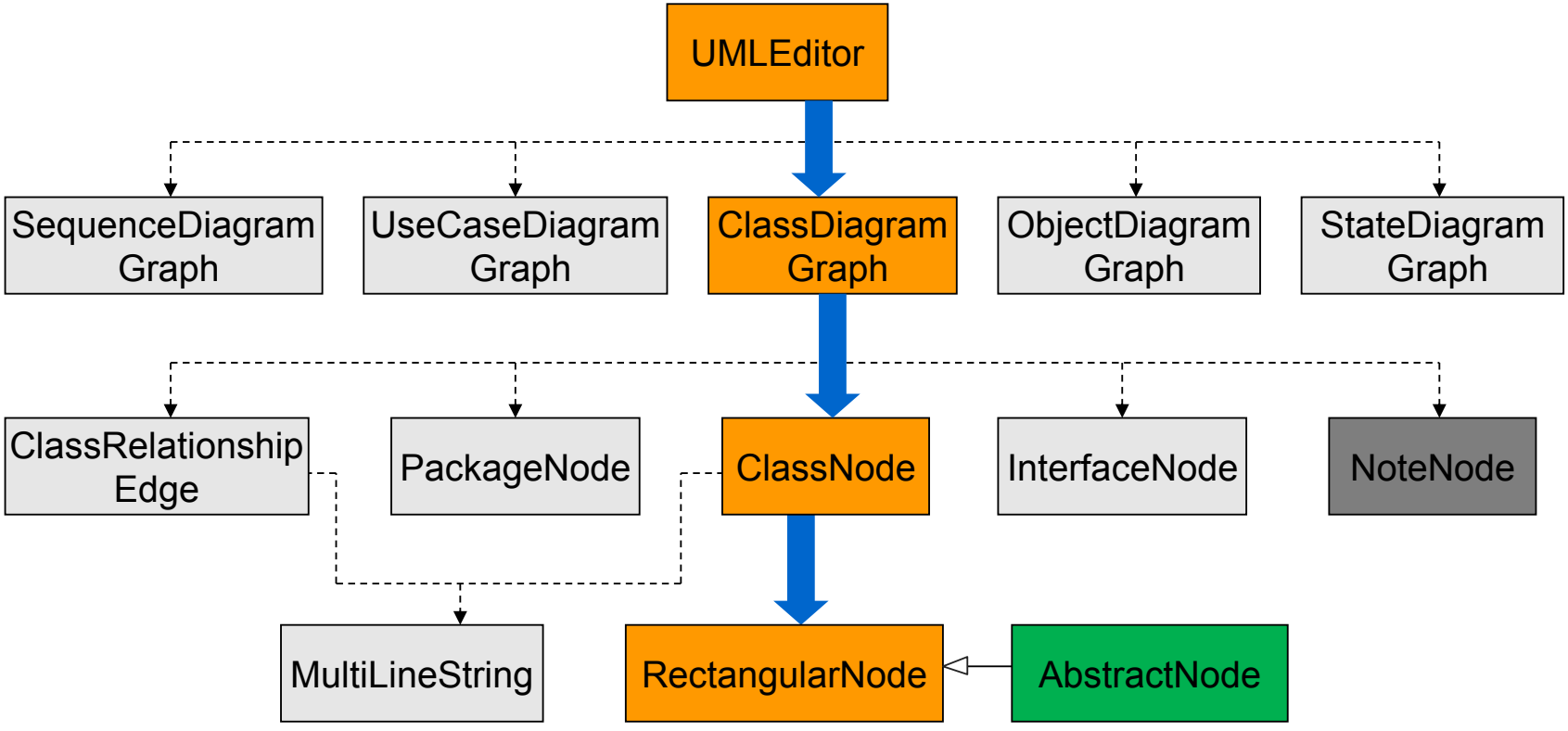
UseCaseDiagram Graph
ClassDiagram Graph
ObjectDiagram Graph
StateDiagram Graph
ClassRelationship Edge
PackageNode
ClassNode
InterfaceNode
NoteNode
MultiLineString
RectangularNode
AbstractNode

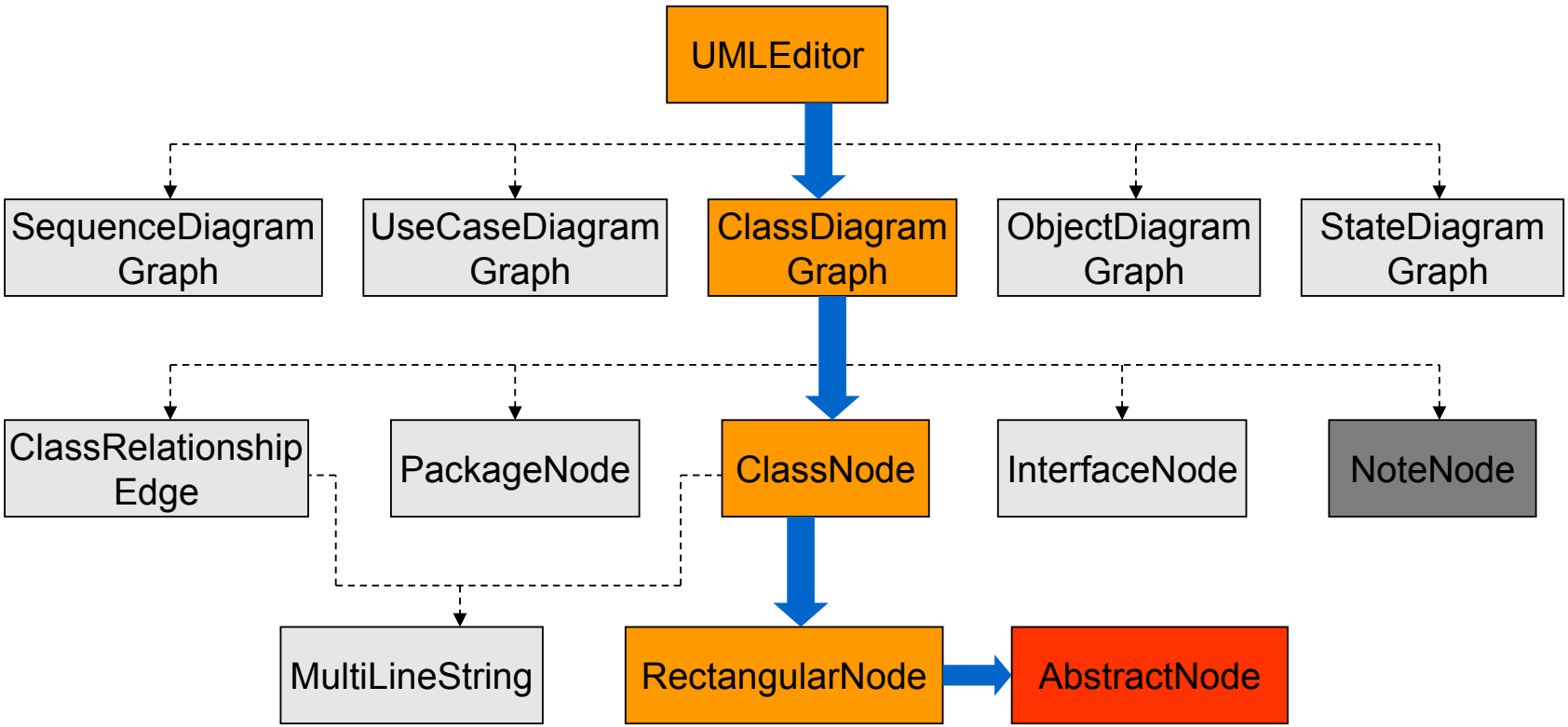
Concept location found



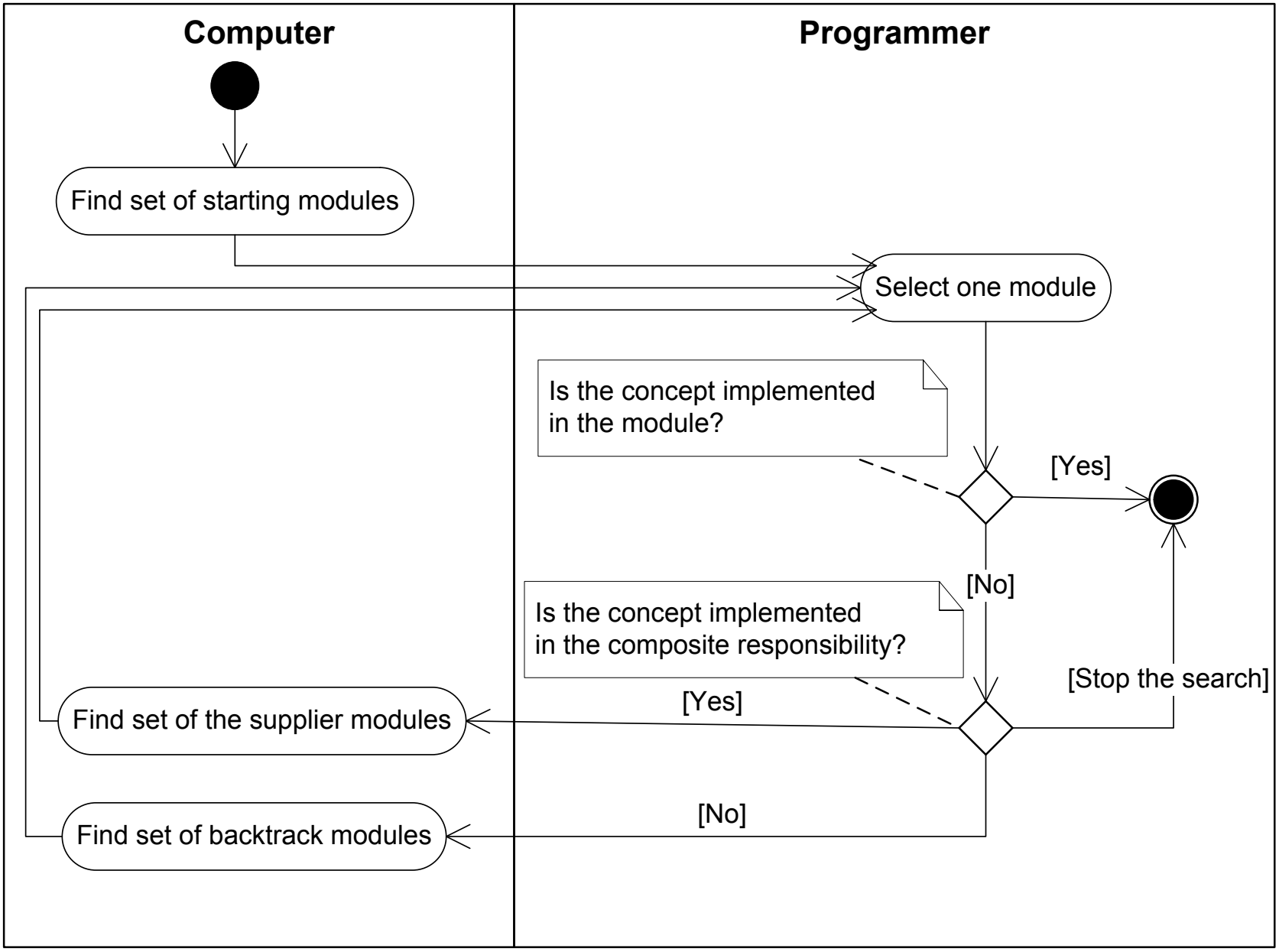
Possible extension of the search



Another location found



Interactive Tool for Concept Location



JRipple: Dependency Search in Eclipse