



Ontology Distribution for a Test Generation System

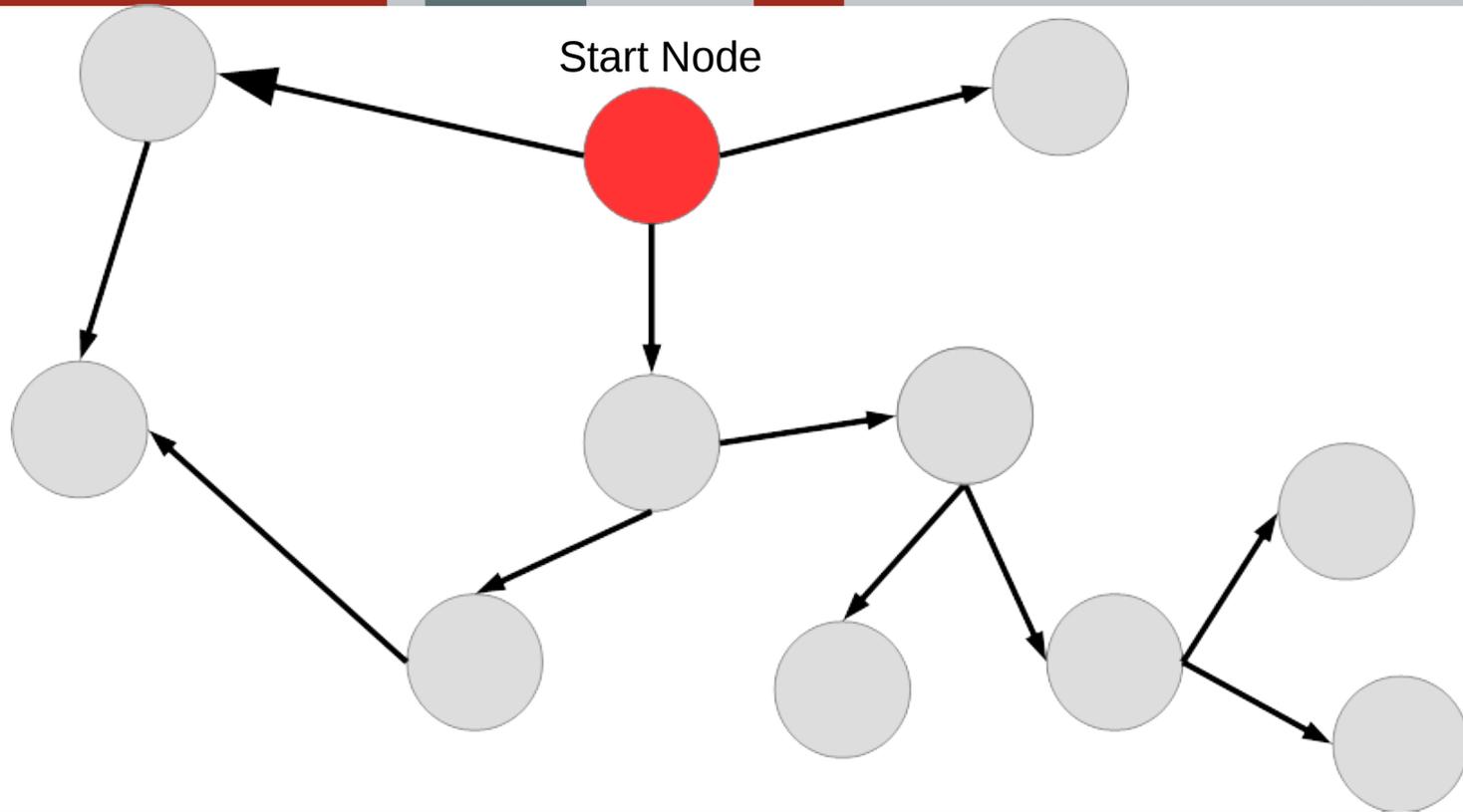
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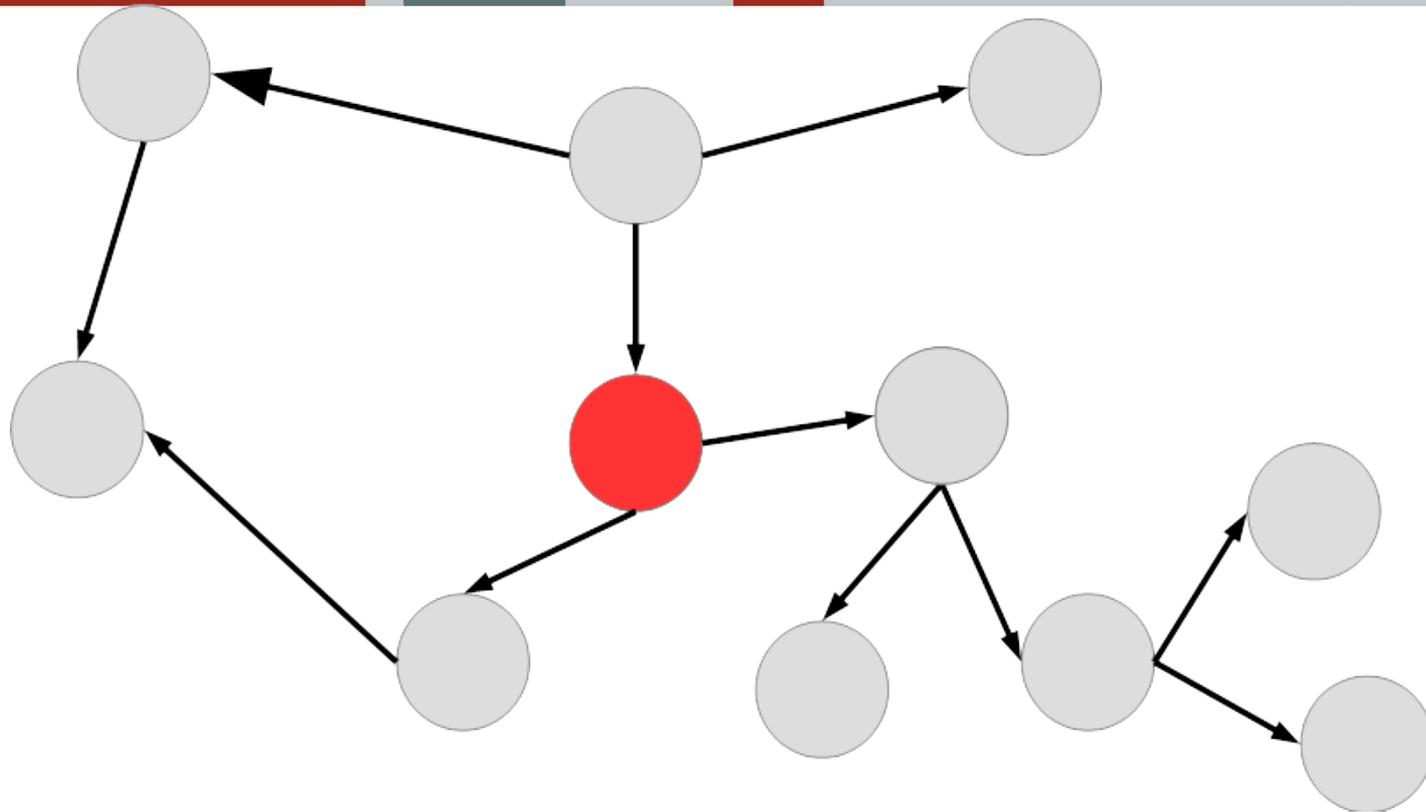
Saint Petersburg State University

Dubna, 2016

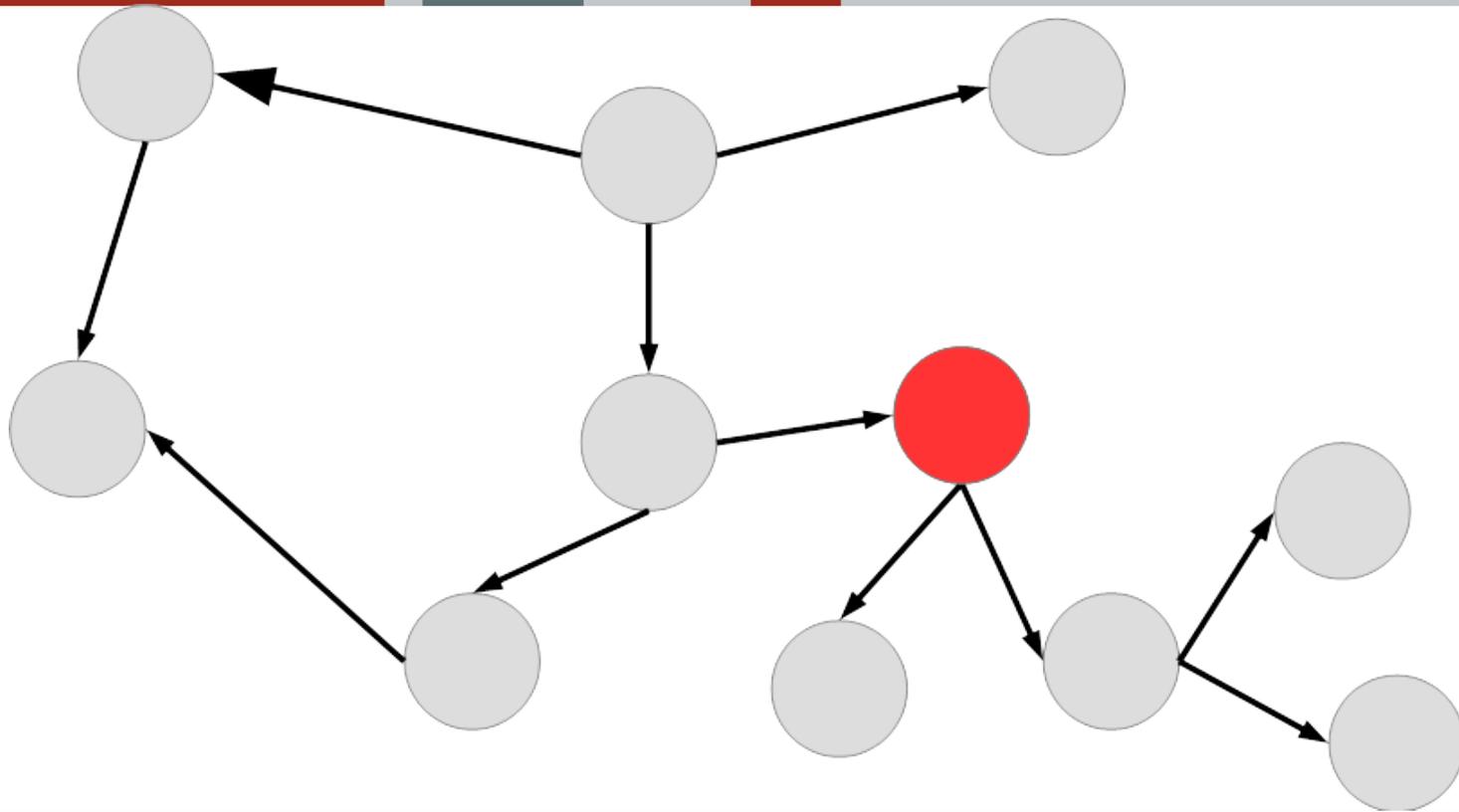
Test Generation System



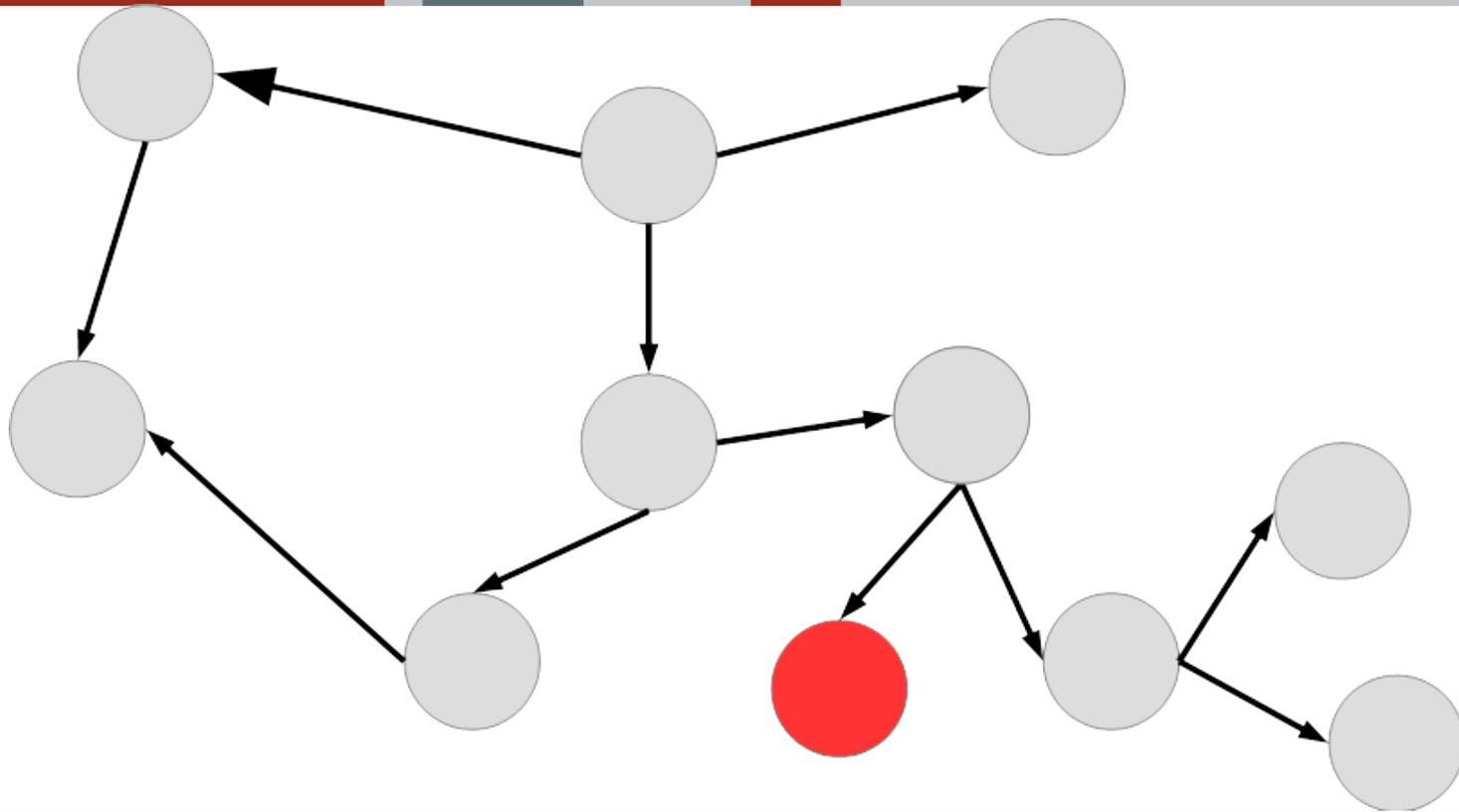
Test Generation System



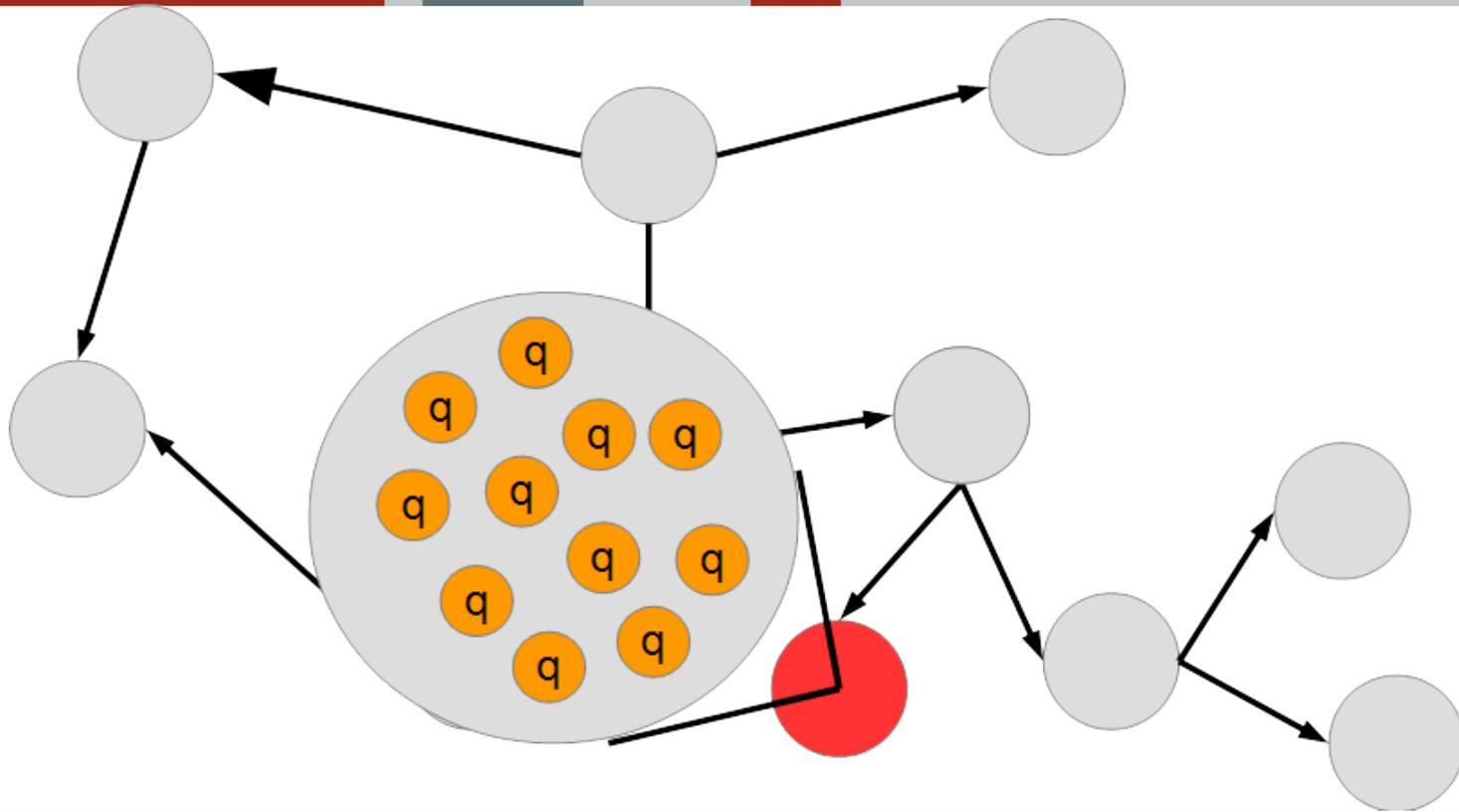
Test Generation System



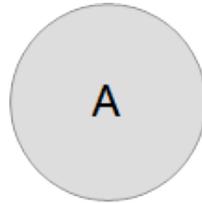
Test Generation System



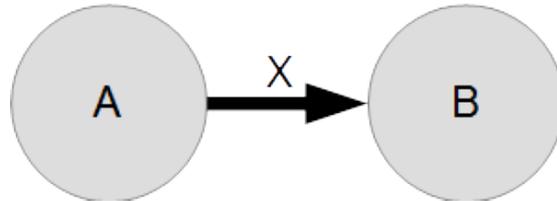
Test Generation System



Test Generation System



node(A)



edge(X, A, B)



"In which county is Ennis located?"



"In which county is Ennis located?"

The rule:

located_in(\$what, \$where), \$type = \$where.type

The question template:

In which \$type is \$what located?

The checking rule:

situated_in(\$what, \$x), \$x.type = \$type

Problems



- High computational cost of inference during test generation
- Single user mode only

Requirements



- Full test generation system functionality provision
- Autonomy of modules
- Reduction of test processing costs
- Modifiability of modules producing



Modularization



Test description

- Test name N
- The number of questions n_q
- A graph A with notions and relations from the ontology for the current test
- A start node v_0 in A
- W_n – a set of numerical parameters of nodes importance in A regarding the test
- W_e – a set of numerical parameters of edges importance in A
- L – an importance bottom limit for notions
- A list of tags T for question selection from notions
- SC – a scoring scheme for test results
- S – a list of templates for question generation and answer evaluation based on the graph A

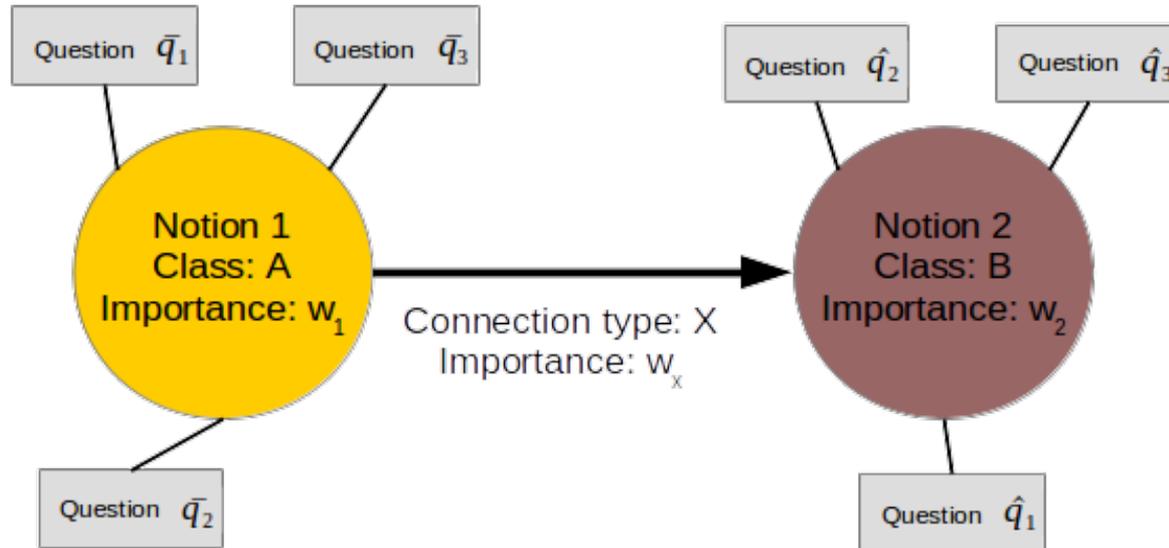


- Test name N
- The number of questions in the test n_q
- A – a semantic network describing questions, notions and relations between them for the current test
- A start node v_0 in A
- L – an importance bottom limit for notions
- Sc – a scoring scheme for test results
- S – a list of templates for question generation and answer evaluation based on the graph A

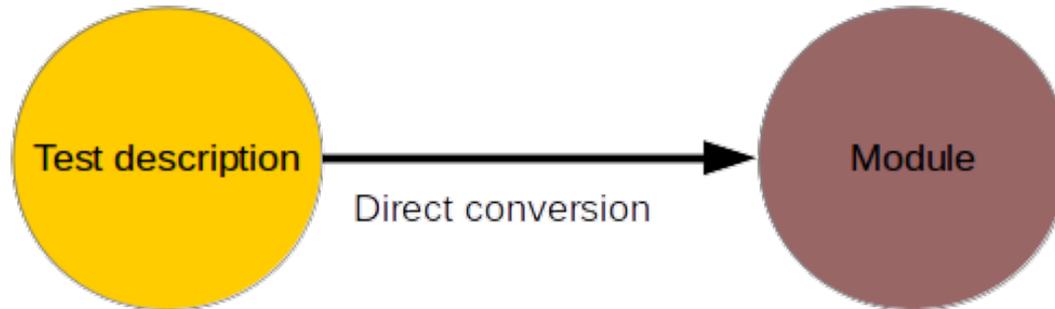


Modularization

Semantic network structure



Module construction: Method I



Module construction: Method II



Module expands itself by adding notions and relations suitable for question generation.

Module construction: Method II



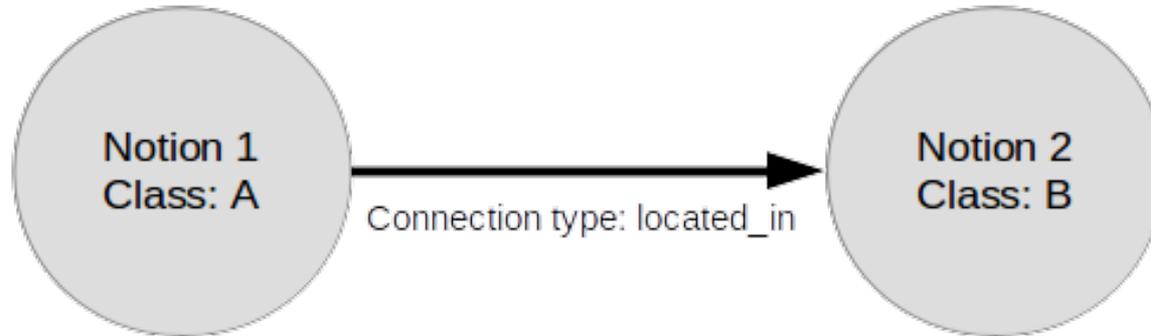
Module expands itself by adding notions and relations suitable for question generation.

The diameter of a question template is the largest diameter among inference graphs, which can be received by applying the question generation template to the semantic network.

Module construction: Method II



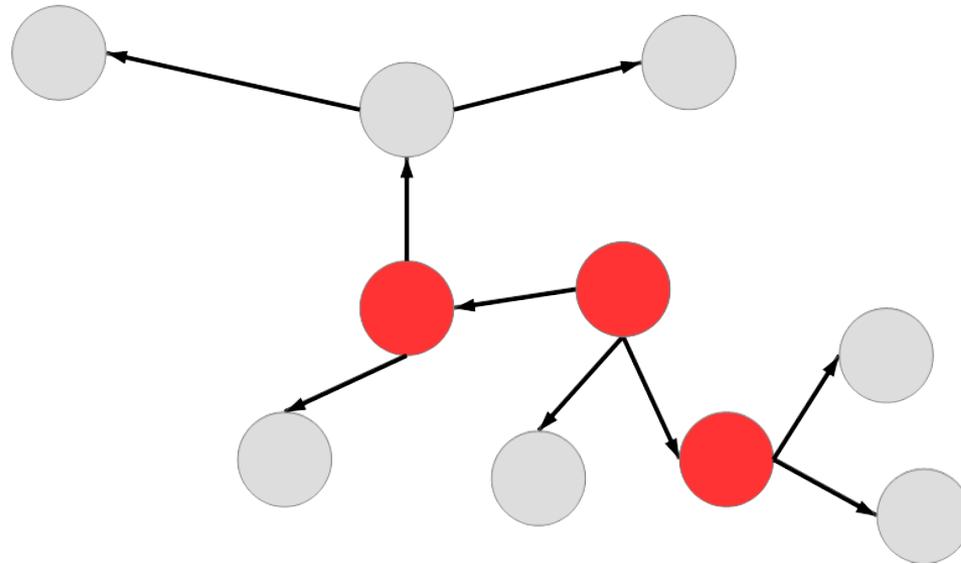
`located_in($what, $where), $type = $where.type`



Module construction: Method II



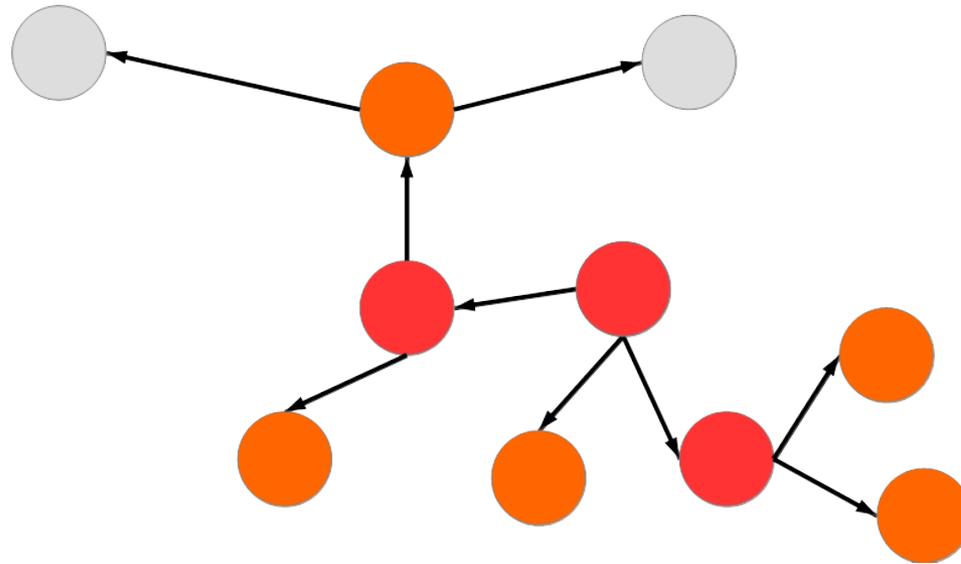
Search space expansion



Module construction: Method II



Search space expansion

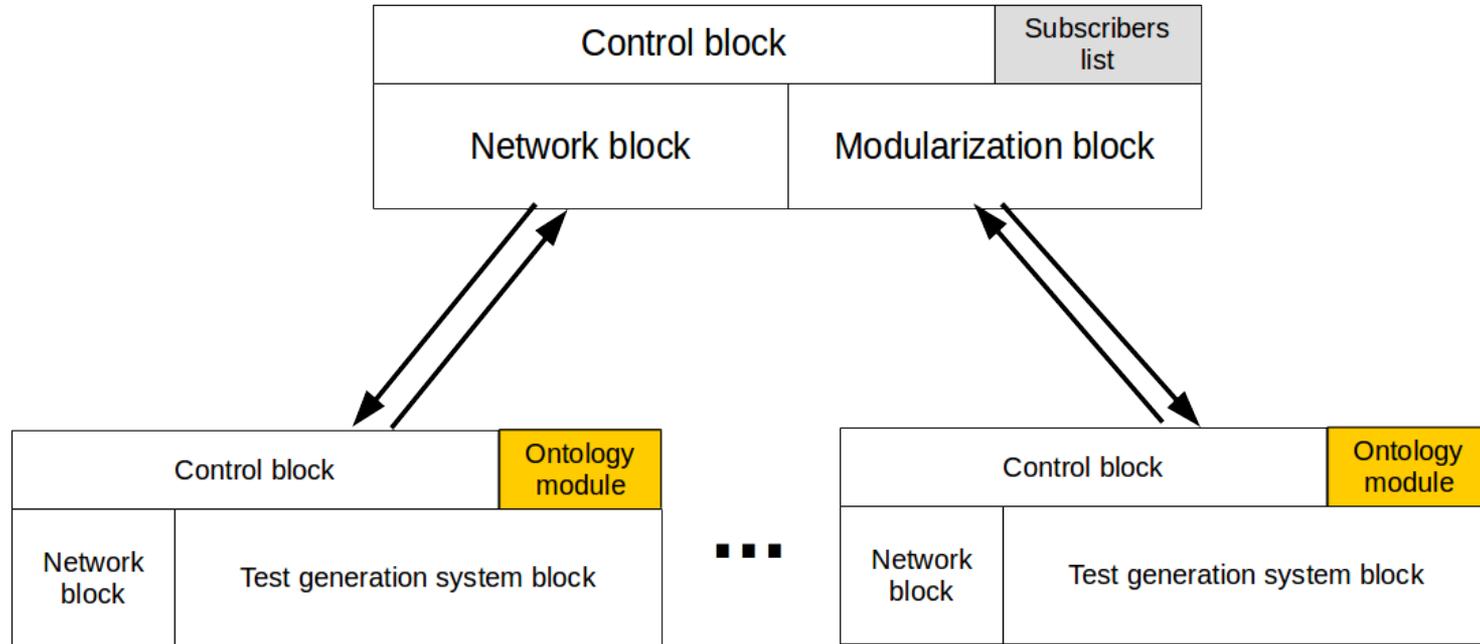




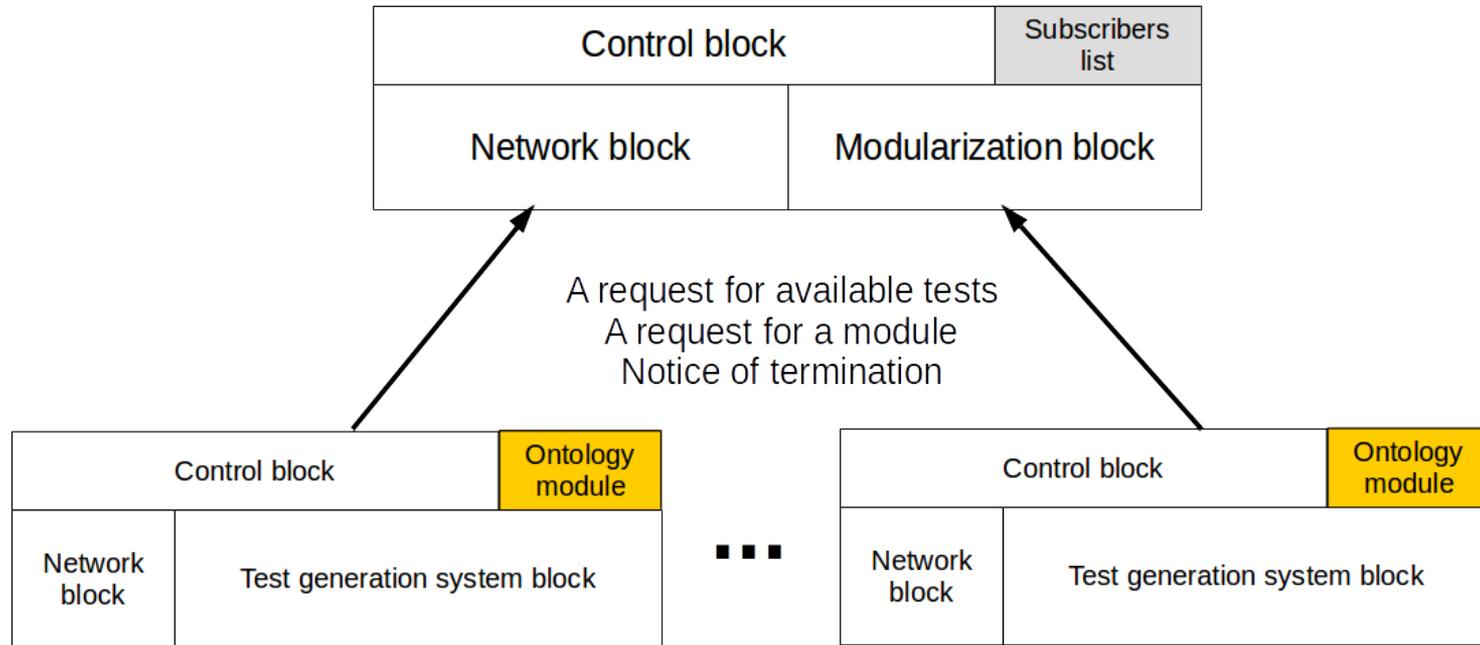
Module construction: Method II

1. Compute the maximal diameter among question templates of the module
2. Expand a search space in the semantic network to the value of the diameter
3. Search for nodes suitable for application of the templates
4. Extend the original semantic network by the new nodes

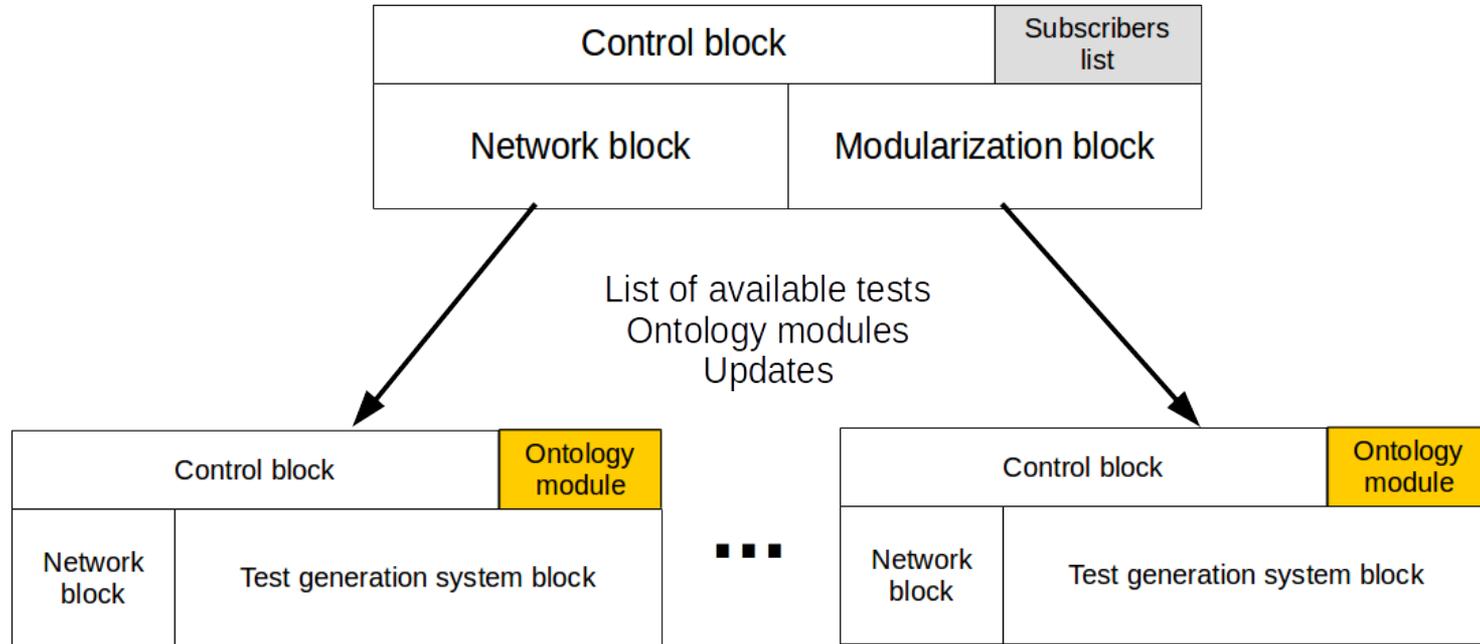
The distributed system



The distributed system



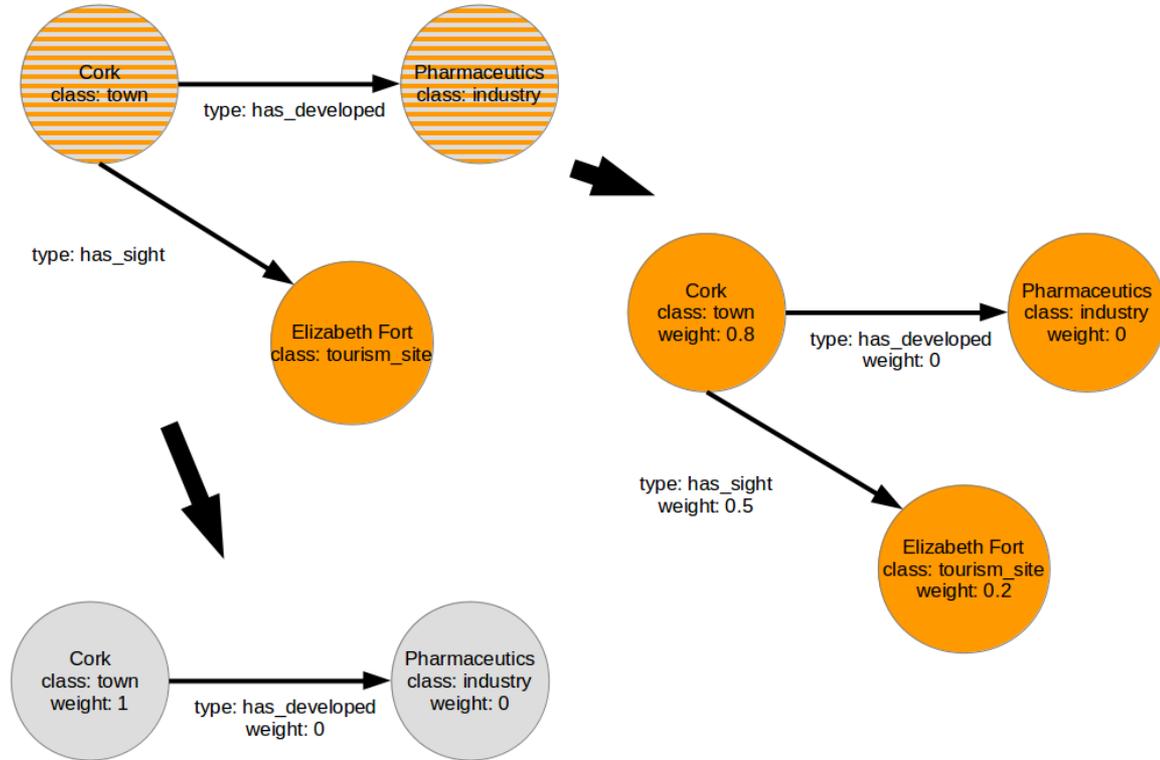
The distributed system



Test modularization



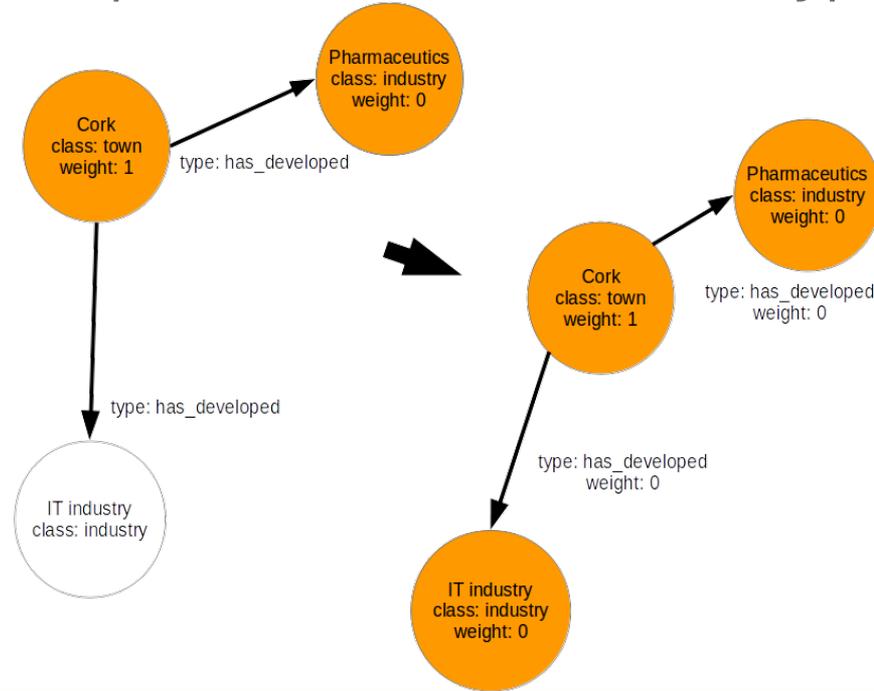
Method I



Test modularization



Method II *has_developed(\$where, \$ind), \$ind.type = industry*



Summary



- Test handling overview
- Module description
- Modularization methods
- The distributed system overview



Thank you!