

# Adaptive ontology- based navigation

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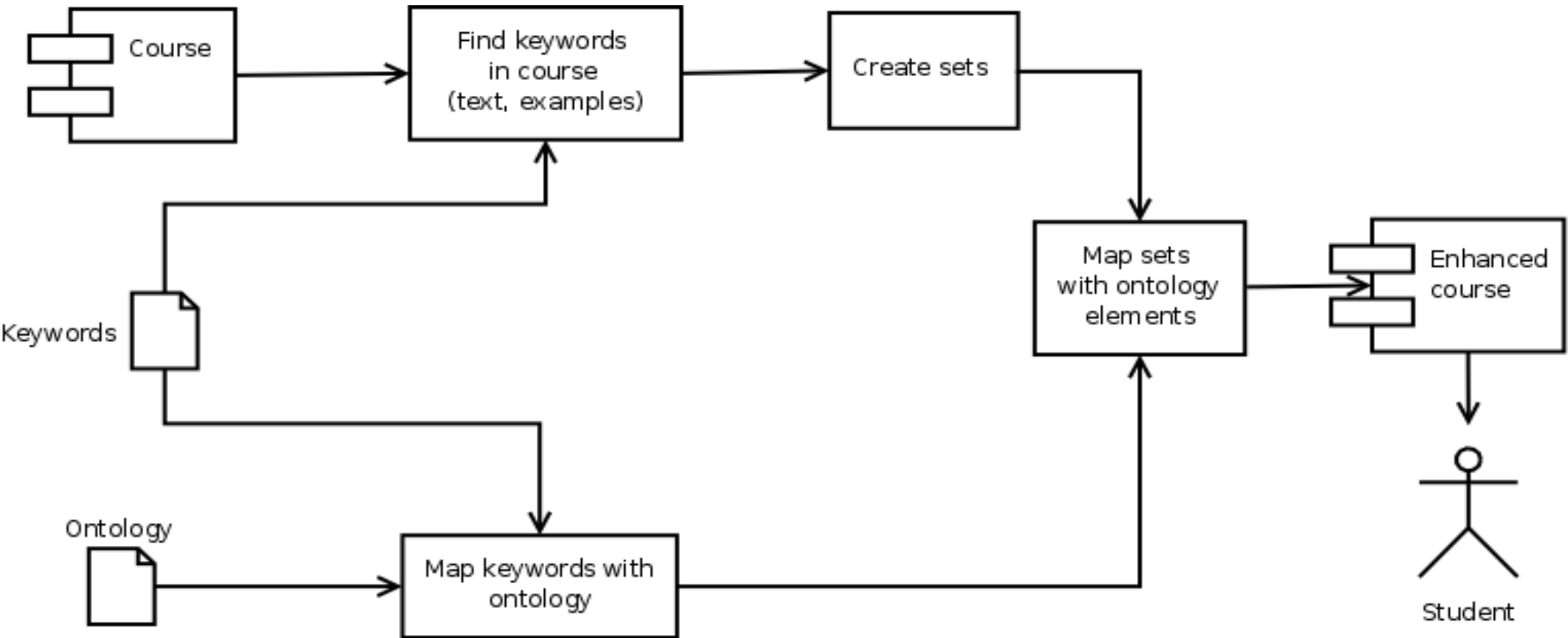
# Short introduction

- We have
  - existing course in (X)HTML format,
  - ontology of the domain,
  - keywords of the domain as binding element between course and ontology (example from C++ course: for, class, attribute, if, else, ...).
- The aim is to navigate students according dependencies between knowledge.
- There is necessary to know all prerequisites to learn new information.
- The goal is the navigation based on content (ontology) and user's goals and preferences.

# Enhancement

- Existing course is enhanced with navigation based on ontology.
- For the interconnection of course and ontology keywords are used.
- For every element of ontology,
  - we define a set of keywords which describes the ontology element.

# Enhancements schema

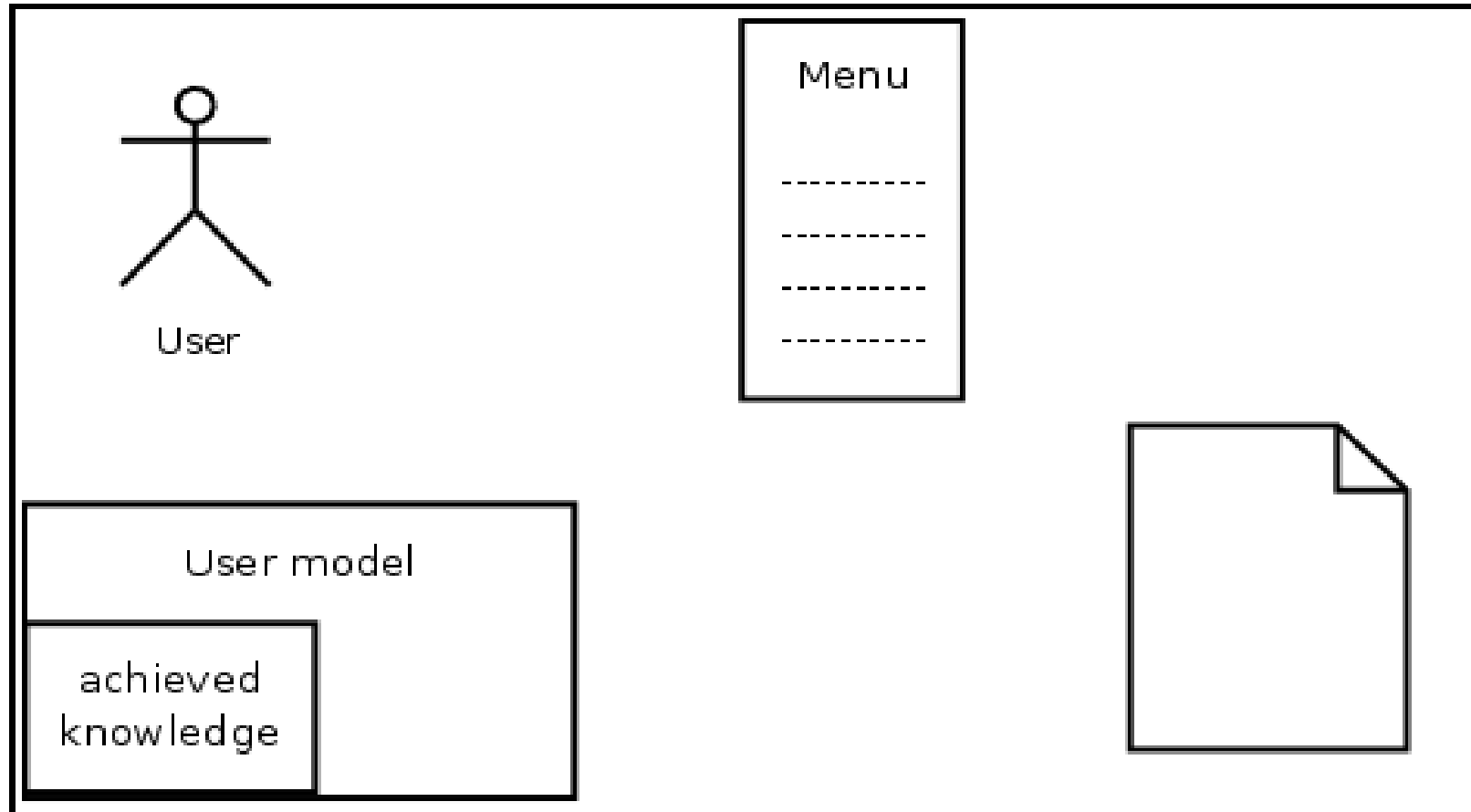


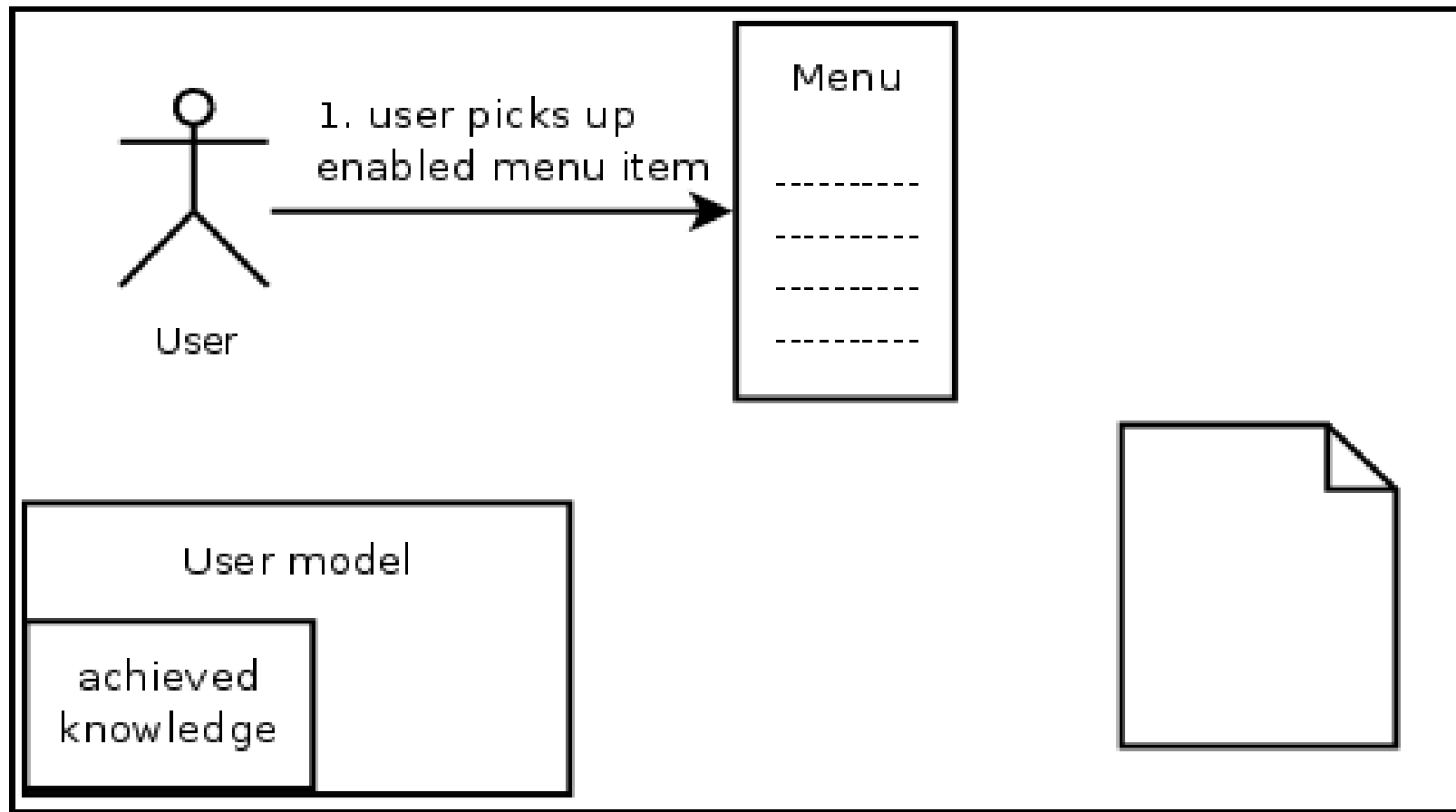
# Concepts processing algorithm

For every concept

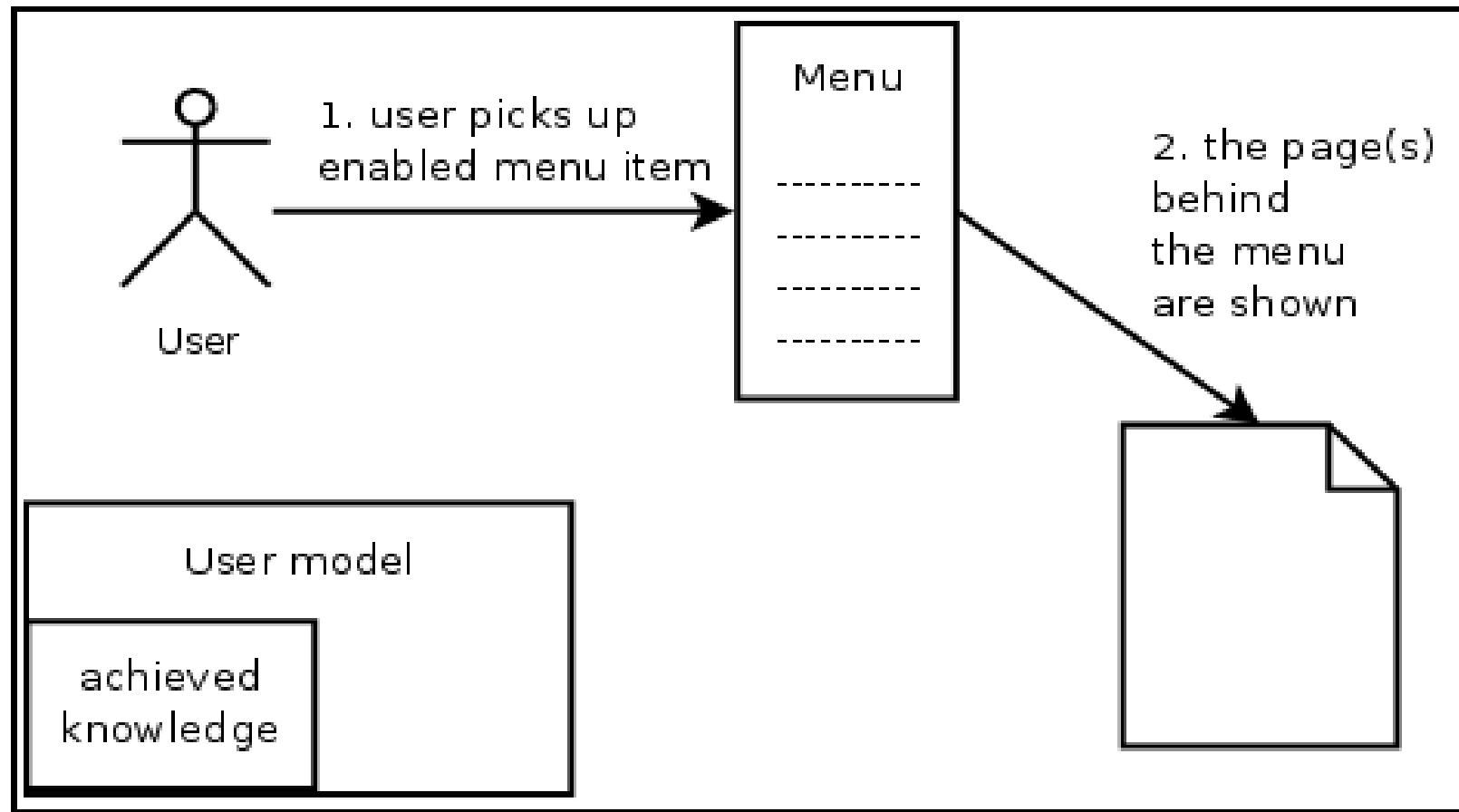
- search for keywords – in learning text, examples;
- found keywords are divided into five sets:
  - in – prerequisites;
  - out – learned knowledge;
  - inout – concept with “advanced” knowledge;
  - not used – keyword which occurs, but have no impact on prerequisites or knowledge;
  - not a keyword – words, which in other situation are keywords.

# Navigation through the course

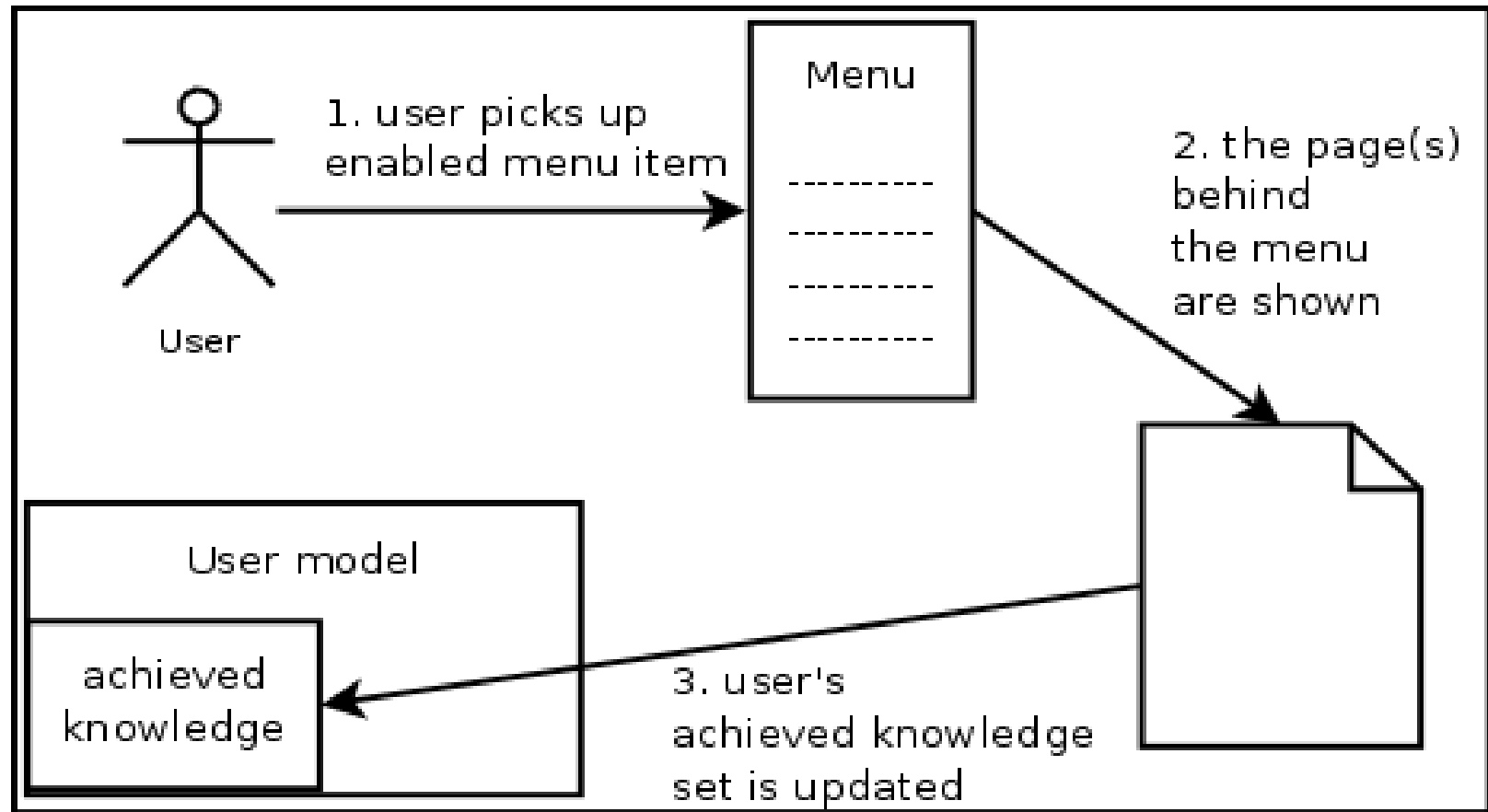




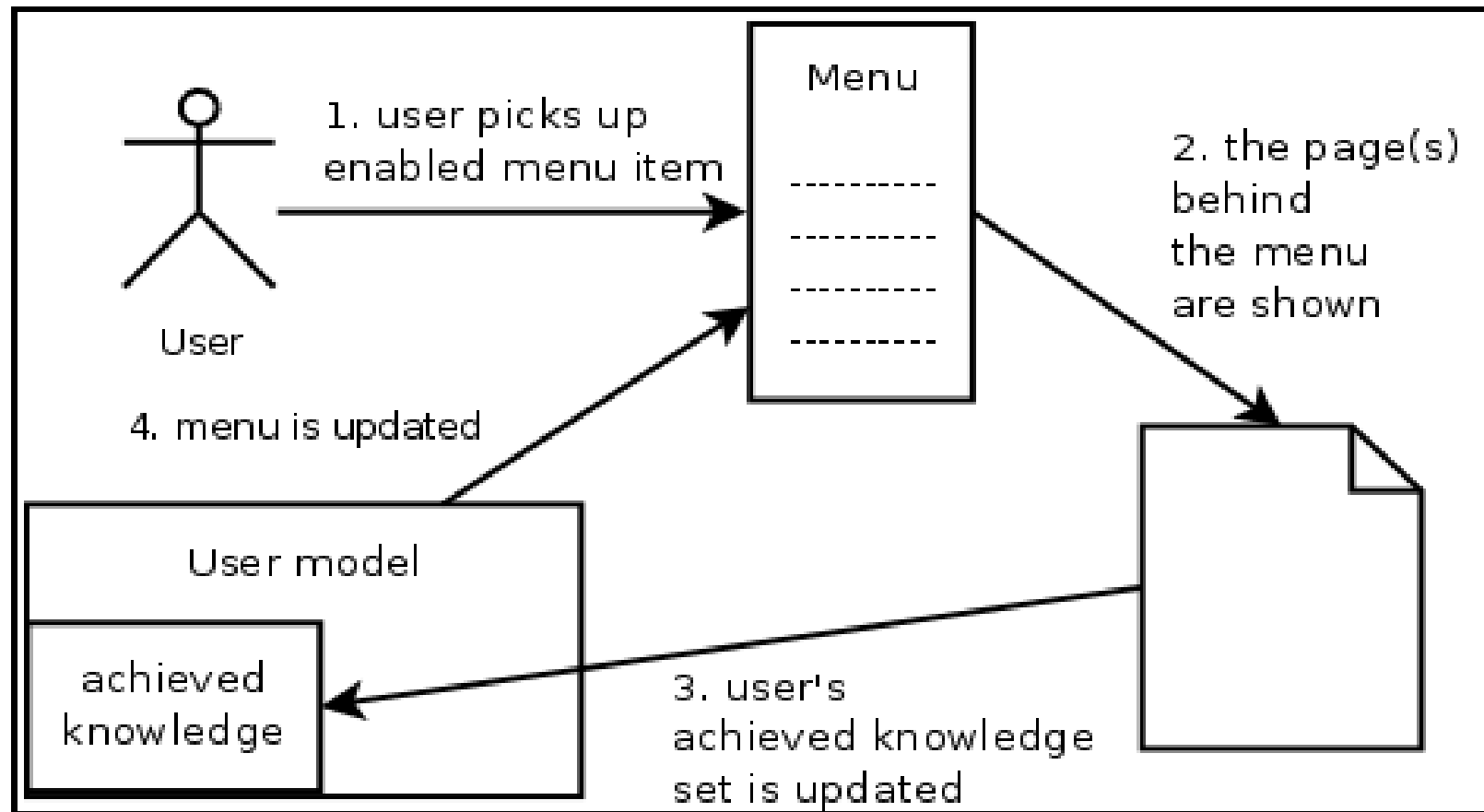
1. Student chooses a concept from available concepts in the menu.



2. According the chosen menu item learning material of particular concept is presented.



3. Optional testing of students knowledge. Student's achieved knowledge set is updated with elements from outcome set of concept.



4. Student's menu is updated. Concepts which all elements from prerequisite set are already in achieved knowledge set are enabled. Navigation continues with step 1.

# User model

- in user's profile we store
  - information about visited concepts
  - “achieved knowledge set” with elements of ontology
- from logs these information can be obtained
  - timestamp of student's visited concept
  - path reconstruction – how the student “walked” through the course

# User model initialization

- basic settings
  - student achieved knowledge set is filled only with concepts where prerequisite set is empty or directly defined starting concepts of the course and students menu is updated accordingly
- knowledge test based
  - student takes a “knowledge test” where system tests knowledge of student about problem domain, according the result of the test, student's achieved knowledge set is filled and menu updated

# User model initialization II

- domain settings
  - student comes from a similar course from same domain – system can reuse what student had already learned
- course subset settings
  - student comes to system only with limited amount of goals, needs only to learn a limited amount of information – the system offers to student only a subset of the concepts, which lead to desired goal

# Future work

- the course is living
  - incremental updates of the course – concepts added, altered or deleted
  - old versions of the course should be stored? (for history purposes, path reconstruction)
- analysis of the logs
  - path reconstruction, concept utilization, feedback...
- transition of the achieved knowledge from one course to other in the same problem domain
  - mapping between two courses (based on their ontologies?)

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