

# **Advanced Adaptivity in Learning Management Systems by Considering Learning Styles**

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# Why shall we consider learning styles in LMS?

- Learning Management Systems (LMS) are commonly used in e-education but they provide the same course for all learners
- Learners have different needs and characteristics
- Adaptivity increases the learning progress, leads to better performance, and makes learning easier

# Aim of Research

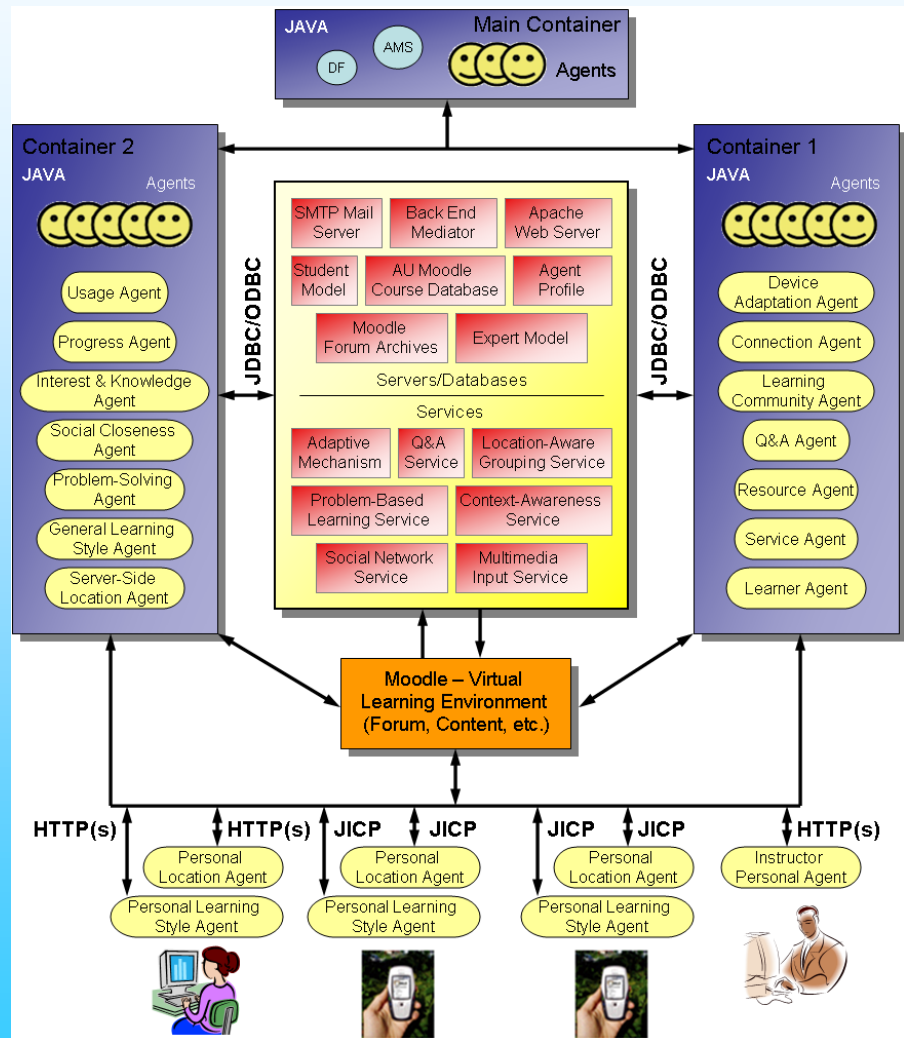
- Develop an advanced adaptive mechanism that
  - enables LMSs to automatically consider students' learning style
  - allows teachers to adapt the mechanism to their courses (rather than modifying the course to the requirements of the mechanism)

# Aim of Research

- In order to reach this goal we aim at:
  - developing an advance student modelling approach, using automatic, dynamic and global student modelling
  - developing a generic framework for providing adaptivity
  - making both work together

# General Issues

- The adaptive mechanism is developed in a general way but implemented as part of a larger project
- This larger project aims at building a personalised mobile learning environment based on different applications/services



# Felder-Silverman learning style model

- Each learner has a preference on each of the dimensions
- Dimensions:
  - Active – Reflective
  - Sensing – Intuitive
  - Visual – Verbal
  - Sequential – Global
- Differences to other learning style models:
  - Combines major learning style models
  - New way of combining and describing learning styles
  - Describes tendencies
  - Describes learning style in more detail



# Automatic Student Modelling

- Detect learners' characteristics from their behaviour and actions in a course
- Procedure:
  - While students are learning, their behaviour and actions are tracked by the system
  - Information about students behaviour and actions are used as patterns and used as input for the calculation process of learning styles
- Advantages:
  - No additional work for students
  - Information is free from the problem of inaccurate self-conceptions of students
  - analyses data from a specific time span → more accurate & allows tracking changes in learning styles

# Dynamic Student Modelling

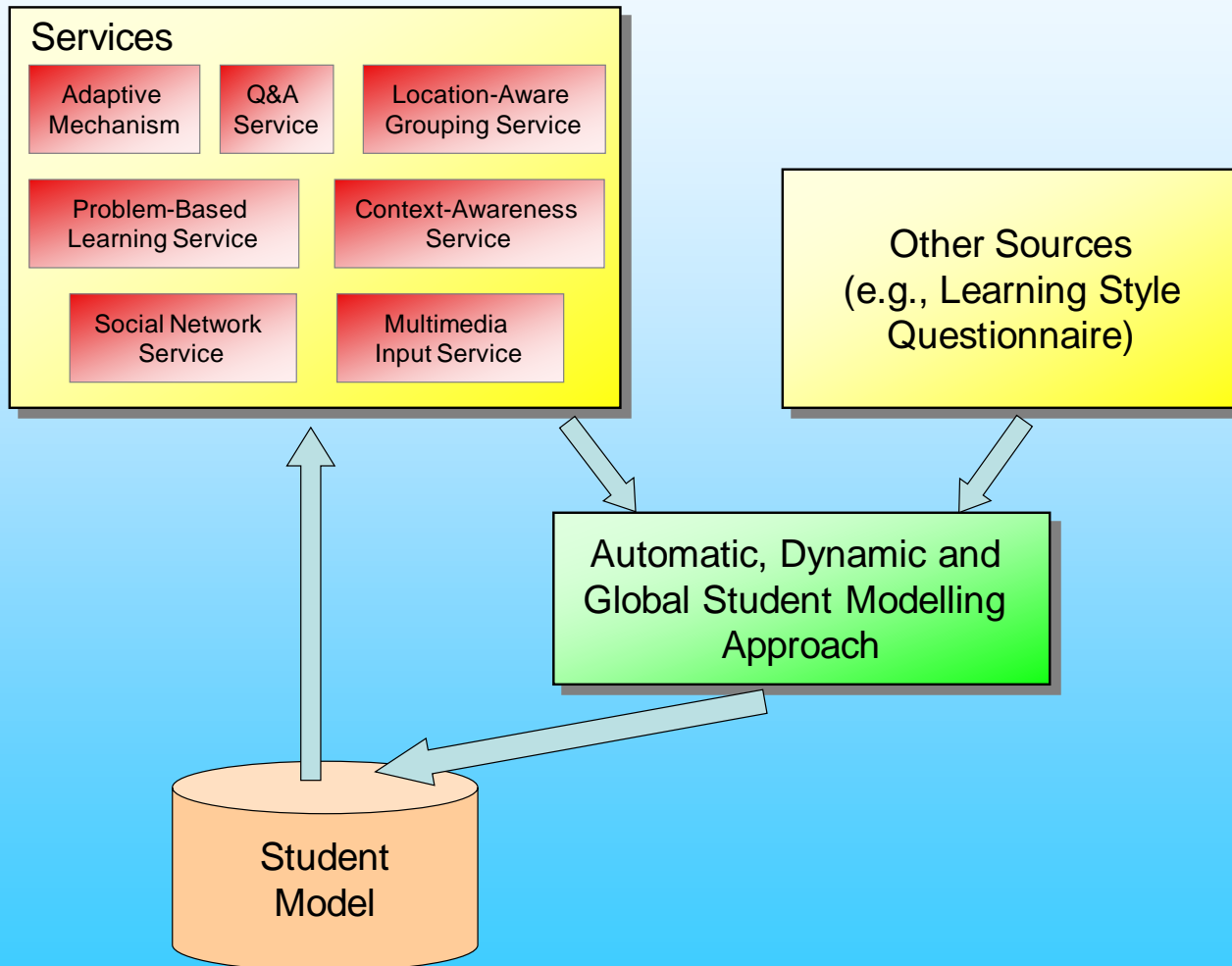
- Information about students' behaviour and actions is used for updating the student model frequently
- Procedure:
  - Monitoring students' behaviour and actions
  - Once enough evidence is available, revise information in the student model
- Advantages:
  - Allows to response to changes in students' learning styles
  - Allows to revise information about students' learning styles based on their current behaviour and actions



# Global Student Modelling

- Considering data from all applications and services in the student modelling process
- Procedure:
  - Gathering data from all applications/services
  - Making information in the student model available for all applications/services
- Advantages:
  - More data in order to calculate learning styles more accurately and in less time
  - One application/service can benefit from the data of other applications/services

# Advanced Student Modelling



# A Generic Framework of the Adaptive Mechanism

- Adapt the adaptive mechanism to teachers preferred course structure and used types of learning objects
- Configuration tool:
  - Which types of learning objects should be considered?
  - How shall they be considered in an adaptive course?

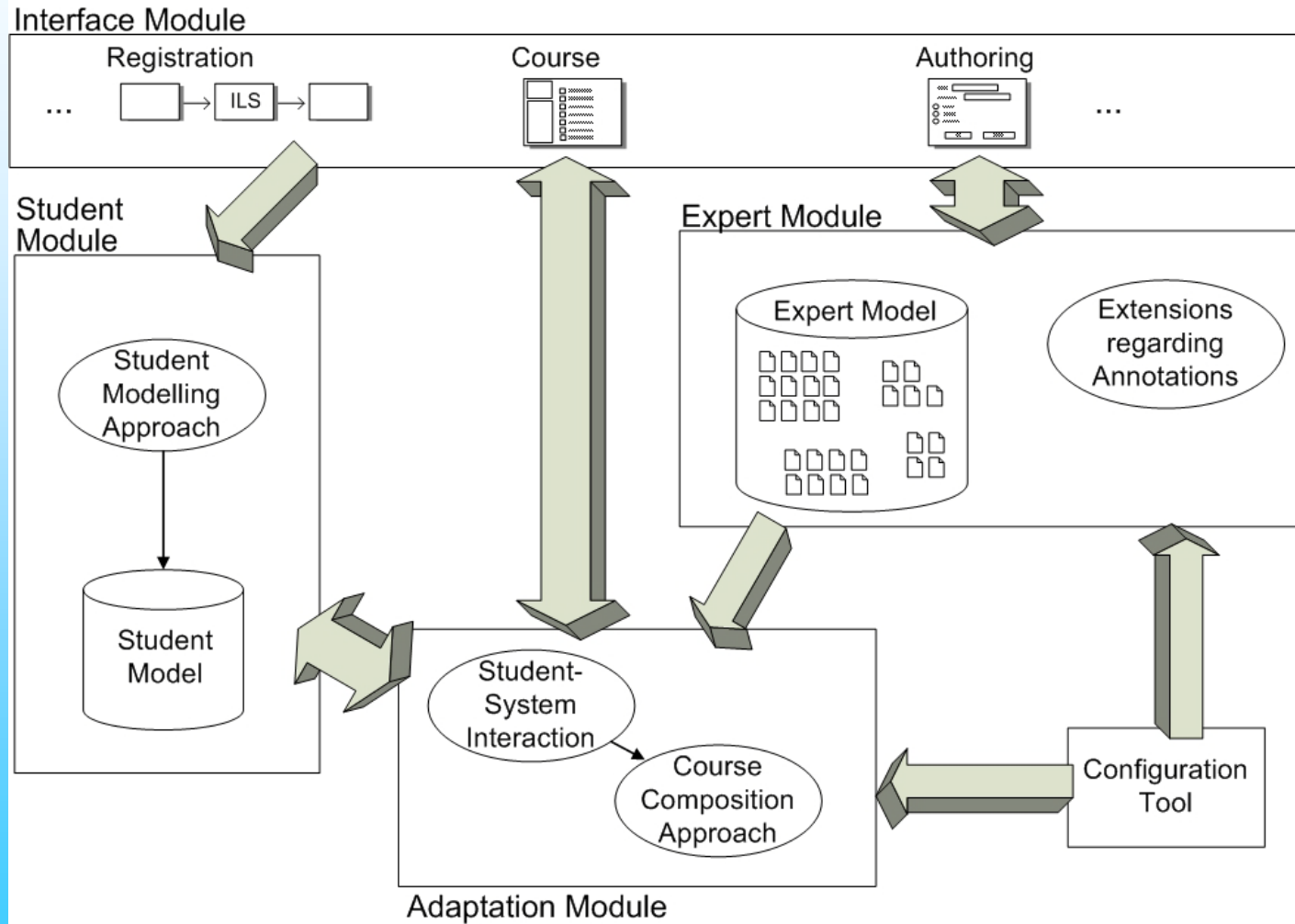
# A Generic Framework of the Adaptive Mechanism

- Defining a new type of learning object
  - Which learning style can be supported by the new type?
  - How is the type of learning object represented in the learning system?
  - What are suitable adaptation features?
    - Define adaptation feature based on predefined strategies such as:
      - Present A before B
      - Provide a high number of A
    - For which learning style shall the new adaptation feature be applied?

# A Generic Framework of the Adaptive Mechanism

- After a new type of learning object has been created
  - Authoring tool is automatically extended so that authors can specify the new type of learning object
  - Expert model is extended in order to be able to store the new type of learning object

# Provision of Adaptive Courses



# Conclusions

- Adaptive mechanism provides students with advanced adaptivity and is adaptable to teachers' needs
  - Automatic, dynamic, and global student modelling
  - Generic framework
  - Interaction with students
- Future Work
  - Completing the implementation
  - Evaluating the mechanism with respect to effectiveness and usability