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# Strategically Segmented Problem Solving

Solution paths for complex problems are partitioned into *strategic segments* and used to evaluate students' systematic choices. In the process of solving paradigmatic problems, students learn to *articulate milestones* that indicate a segment of a solution path and to *formulate heuristic principles* that provide guidance for approaching the next segment. The project is supporting a significant step from sophisticated computer assisted teaching to engaging individual learning.

## Technology Supported Individual Learning

- Material fully computer based
- Many Interactive Learning Environments (ILEs)
- Problem Solving Steps

## Strategic Organization of Solution Paths

### Cloud Computing

Enhancing the recognition and retention of project insights through gated interactive segmentation and identification of a learner's strategic decision making while engaging in large computer science projects.

Gated project segmentation to enhance the recognition and retention of key insights is achieved through multi-level quizzes served through our AssessMe microservice. Problem solving strategy identification is accomplished through embedded AssessMe surveys. Plans to automate strategy detection are ongoing.

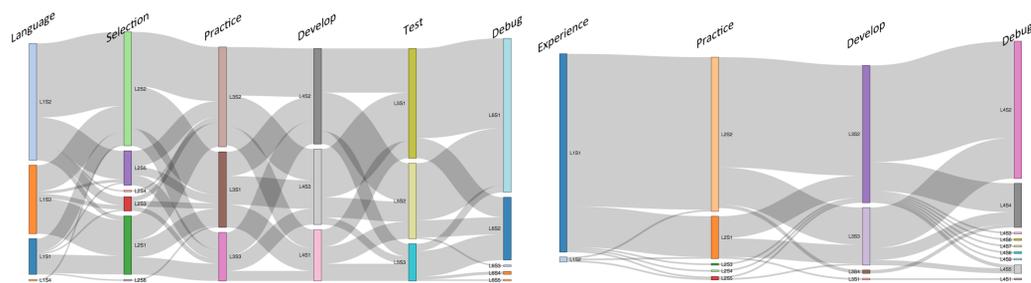
- Solution design decisions
- Implementation, testing and debugging approaches
- Approach to learning a new language or framework
- Approaches to exploring and debugging with large datasets

### Logic & Proofs

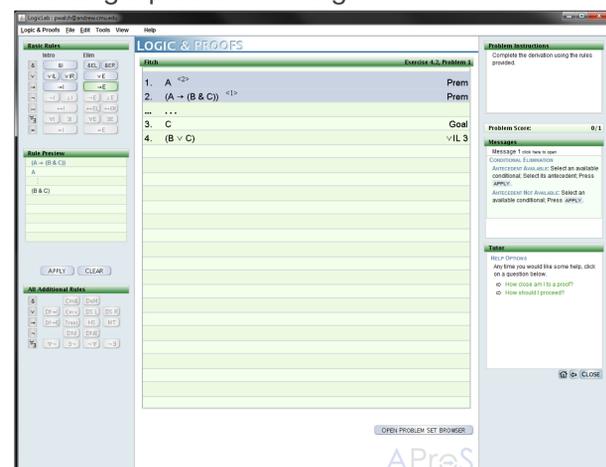
Providing systematic, transferrable ways of addressing logical and mathematical problems in a bidirectional fashion.

The concrete logical topic is *strategic proof construction* in sentential and predicate logic. The construction procedure methodically examines the logical search space. This strategic procedure is efficiently implemented in the system AProS, which provides the dynamically generated intelligent support for tutoring.

- Logical rules and articulation of strategies
- Reflective exploration of strategies
- Student driven dialogue with Tutor
- Tutorless, but strategic problem solving



Strategic decisions made by cloud computing students while working on two projects, one on finding influencers in a large social graph using Apache Spark (left) and the second on using two real-time streams of user requests and car locations to associate a car with a user (à la Uber) using the Apache Samza stream processing framework.



This is the interface of the PROOF LAB in which students construct proofs. In the right lower window the student can enter into a dialogue with the Proof Tutor.



Simon Initiative Seed Grants