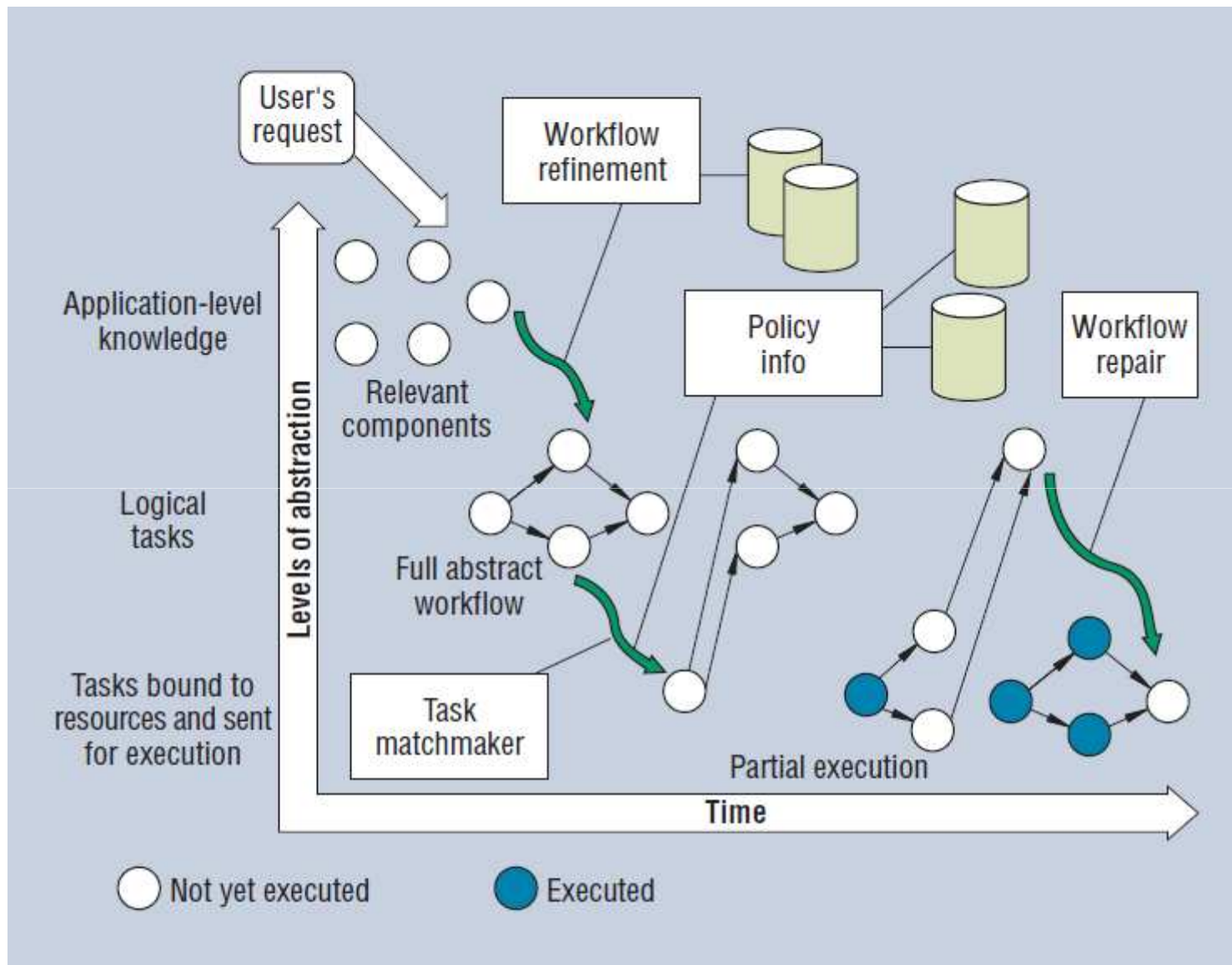


# CS-498

Ngoc-Tung Nguyen  
Summary of Articles

# Challenges for robust workflow generation and management

- **Knowledge Capture**
  - High-level services (workflows) are starved for information & expressive description of grid entities
- **Usability**
  - Shift the difficulties of managing the mechanisms of a Grid Environment from user to automations
- **Robustness**
  - Failures are common due to the highly distributed heterogeneous systems
- **Access**
  - Must be able to handle users access polices, authentications, and security
- **Scale**
  - In the near future, data will reach the petabyte scales
  - A need exists for managing complex workflow generations to balance the accesses to resource, bottle necks, and repairing workflows incase of failures



# Modeling workflow composition as a planning problem

- **Planning Operator**
  - The operators 'effects and preconditions reflect two information sources: data dependencies between the program inputs and outputs, and the programs 'hardware and software resource requirements.
- **The Initial State**
  - The planner receives as input an initial state that captures information from several (Hardware, bandwidths, Relevant data files)
- **Goals**
  - Goal given to the planner represents a metadata request for information and a location on the network where the data
  - Specify the programs or host machines to use, for intermediate or final steps should be available
- **Search control rules**
  - Rules help the planner quickly find good solutions based on preferences for resources and component operators
  - Search the space of all plans more efficiently to find high-quality plans, given more search time

Automatically composed workflows for grid environments

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Volume 19, Issue 4, Jul-Aug 2004 Page(s):16 - 23

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# Modeling workflow composition as a planning problem

- **Using the planner**
    - Preparing the input problem specification
      - The *current-state generator produces* the initial state description, and the *request manager produces the goal description* from a user request
    - Practical considerations for using AI planning for workflow composition
      - To make the most efficient use of AI planning, we have to integrate the planner with specialized subsolvers that were more efficient for certain subproblems. Other researchers have taken similar approaches to integrate AI planning
- with scheduling systems
- Interpreting the output plan as an executable workflow
    - Once the plan is complete, the AI planner sends it to the request manager as a partially ordered set of tasks

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