Research Review

Source 1: J. Blythe, E. Deelman, Y. Gil, C. Kesselman, A. Agarwal, G. Mehta, K. Vahi. The role of planning in grid computation. In Proceedings of the first International Conference on Automated Planning and Scheduling, (ICAPS 2003).

This paper describes the use of AI planning in grid computing especially for scientific computing where a set of tasks are assigned to a pool of hardware resources and the job of the pool is to execute the tasks in a specific workflow to output the data in an efficient manner. Big data analysis and scientific computing is a major focus of the industry these days so I found this paper to be especially important.

Source 2: Blythe, J., "Decision-Theoretic Planning", AI Magazine, Volume 20, Number 2, Summer 1999.

This paper describes the challenges and current options to tackle planning under uncertainty or incomplete domains. I found this paper to be very interesting as likely most real world problems have some level of uncertainty or un-completeness. One of the presented strategies is called the Weaver probabilistic planner. These method takes 3 steps to find a plan:

1. First, the plan is found ignoring external unknown events
2. Second, the algorithm determines the mapping between which external unknown events will cause changes to which steps in the current plan
3. Third, the algorithm optimizes the plan by adding conditional branches or by trying to reduce the probability of undesired external events

The example given in the paper is a tenant moving apartments. A simple plan is effectively to load stuff, drive truck to new apartment, unload stuff. However, external events could occur such as the landlord not staying at the apartment to give the key which could change the plan to load stuff, drive truck to new apartment, drive truck to landlord, pick up key, drive truck to new apartment, unload stuff. The plan however could be optimized by calling the landlord to ensure he stays at the apartment.

Source 3: Yolanda Gil. "Plan Representation and Reasoning with Description Logics".

This paper explores more expressive ways of documenting and representing planning problems. I found this paper to be interesting as it expanded upon the different logic types (propositional, first order) that was used to describe planning problems. One of these is to use description logic to represent goals better (Referred to as Goal Taxonomies in the paper).

The main reasons behind this approach is to:

- Have better data parameter representation in goals

- Use a more natural language (ex: move OBJ (instance of cargo) WITH (instance of aircraft) vs In(C1, P1))
- Have more support for flexible matching and reformulation which might be considered similar to object oriented programming's principle of inheritance where a base class of vehicle could be used to represent more specific classes of aircraft, truck, etc. See Figure 7 from paper: