Course Project Overview

Course Project Purpose

For this course's project, you will complete one project. This reading provides an overview of what you'll be doing for the project, the project milestones, and how your project work will be evaluated. This reading includes **the actual project materials** as well as covers other important project information to ensure that you are fully prepared to complete the course project successfully.

You are encouraged to **use this reading as a reference resource** for the project throughout the course. In addition, video walkthroughs of the projects, one video for each project, follow this reading to help you select which of the projects you want to complete.

Degree students may use this course's projects for the Request for Faculty Review: MCS Project Portfolio. This is **optional** and **only** for degree students wanting to use this course's projects as part of their portfolio degree requirement/specialization requirements.

CSE 579: Course Project Introduction

For this course's project, you will work individually to develop the skill of solving real world problem using logic programming. This project option was included in the ASP Challenge 2019 and present opportunities for you to demonstrate your ability to contribute to industrial applications of knowledge representation and reasoning, specifically industry application of answer set programming (ASP). The project will require that you meet milestones by submitting deliverables throughout the course and will account for 30% of your grade. It will therefore qualify for inclusion in your MCS Portfolio.

Milestone requirements and deliverables are detailed in the weeks they appear. Below, however, is the project schedule at a glance, including grade values for each deliverable. In general, Milestone 1 and Milestone 2 ensure that you are ready to run logic programs for this project, Milestone 3 checks your midterm progress, and Milestone 4 requires the final project report. Milestone 5 is optional and is for students who want to request that they be allowed to include this project in their final MCS Portfolio.

Week	Milestone	Deliverable(s)	Grade %
1	n/a	n/a	n/a

2	1	* Solution to Introductory Clingo Program	5
3	2	* Solutions to Basic Clingo Problems	15
4	n/a	n/a	n/a
5	3	* Individual Progress Report	30
6	n/a	n/a	n/a
7	4	* Individual Project Report	50
8	5 (OPTIONAL)	* MCS Portfolio Inclusion Request (OPTIONAL)	n/a

Project Overview

As mentioned above, the problem at the center of this course's project option was included in the ASP Challenge 2019, which invited companies to provide descriptions and instances of industrial problems from areas that are traditionally of interest to the community of answer set programming (ASP). The participants of the challenge were called upon to solve these and several other problems by means of ASP and extensions thereof. To this end, the participants were able to use any available ASP system to solve the problem at hand. For the course project, however, all students will use clingo (for an introduction to clingo, see the Week 1 reading titled ("Required Prior Knowledge and Skills and Technology Requirements"). As they were for the challenge's participants, solutions to the problems will be evaluated based on their correctness and efficiency using the problem instances supplied by the companies.

Course Project Description: Automated Warehouse Scenario

Scenario: A simplified version of automated planning done in Amazon warehouses, this project focuses on an automated warehouse in which robots deliver products to picking stations to fulfill orders. A warehouse is represented as a rectangular grid, and the robots can move horizontally or vertically between adjacent cells. To fulfill given orders, robots have to carry shelves with the

required products to matching picking stations. The robots are flat, can move underneath shelves and pick them up. However, a robot that carries a shelf does not fit under another shelf anymore, so that shelves may need to be moved out of the way first.

Challenge: The overall goal of the task is to fulfill all orders in as little time as possible, where time is counted in steps and each robot may (but does not have to) perform one action per time step. You will write hard constraints to find the plan to fulfill all orders. This is a dynamic world problem, meaning that the status of each object may change over time (e.g., the location of each robot may change over time).

Preparation: You will start to write hard constraints from the first milestone and will learn how to write more complex hard constraints in Week 4 and Week 5. Compared to Project Option #1, this project has higher requirement on the hard constraints. (The encodings of the "Blocks World" problem in Week 5 will be a good starting point.) On the other hand, this project does not require the use of weak constraints, thus you don't have to learn external materials for weak constraints as in Project Option #1.

Objective: Demonstrate that you can perform automated reasoning about actions using KR tools.

Details: View problem details and access example instances by downloading the project package via the link that follows.

https://www.mat.unical.it/~dodaro/aspchallenge2019/automated-warehouse-scenario.package.zip

> **automated-warehouse-scenario.package (1)**
>
> ZIP File

The package consists of the following elements:

- description.pdf: a problem description
- simpleInstances/: a folder containing five instances

NOTE: The simple instances are the **test cases** that will help you debug your code.

Project Grading

The project option's "description.pdf" provides detailed information about that project's specific evaluation criteria; however, those criteria will **NOT** be used in this class since they are only for the participants of the ASP challenge 2019. In general, points will be awarded based on effort and the degree to which you adhere to your chosen problem's requirements and follow its specifications regarding what has to be represented, computed, and delivered.

In the actual ASP competition, all entries were submitted to the challenge platform's **checker.sh**, and not delivering exactly what was required led to entries being disqualified. For this project, however, you will be evaluated on whatever you are able to achieve and how well you present your results and the approach you took to achieving those results. Put another way, even students that are not able to fully meet their project's requirements will report what they did and be graded on that.

Detailed evaluation criteria are provided for each milestone as you progress through the project in the "Review Criteria" section (or an equivalent) for each deliverable, usually in the instructions for each submission or other milestone task. Below is a high-level summary of the evaluation criteria.

Milestone	**Deliverable(s)**	**Grade %**	**Evaluation Criteria**
1	* Solution to Introductory Clingo Program	5	*Completion
2	* Solutions to Basic Clingo Problems	15	*Completion *Standards met
3	* Individual Progress Report	30	*Completion *Standards met *Progress made
4	* Individual Project Report	50	*Completion *Standards met
5 (OPTIONAL)	* MCS Portfolio Inclusion Request (OPTIONAL)	n/a	*Completion *Standards met

Project Materials

In addition to the downloaded package for the project option you choose, you will need to use a report kit as the template to write your project reports. In addition, you will be submitting files via and responding to prompts in staff-graded assignments. Please download the "Project Report Kit" that follows. It is adapted from the Author Kit used by the Association for the Advancement

of Artificial Intelligence, the organization whose conventions and style manual you will be expected to use for the project reports.

CSE579_course-project-report-kit_AAAI

ZIP File

Project Help

If you have trouble completing any of the project milestones, you are encouraged to visit the course's weekly Discussion Forums, as many of your peers are likely to have had similar problems and found a solution. These forums are also likely to be the fastest way to get answers to your questions.

Another option is to ask the course instructor/facilitator to answer your question during a live event or office hour. You may submit your questions in advance by posting them to the discussion forums even if you are not able to attend in person, as recordings of all live events/virtual office hours will be shared in the course week by week.

If the above methods do not result in your finding or receiving an answer that helps you move forward with your work as quickly as needed, you may request assistance by sending an email to mcsonline@asu.edu.