

CS370



Symbolic Programming Declarative Programming

LECTURE 1: Course Overview

Jong C. Park

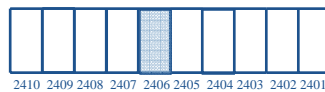
park@cs.kaist.ac.kr

Computer Science Department
Korea Advanced Institute of Science and Technology
<http://nlp.kaist.ac.kr/~cs370>

Administrivia

⊙ Instructor

- ◆ Jong Cheol PARK
- ◆ park@cs.kaist.ac.kr
- ◆ 869-3541 (office)
- ◆ Office Hours
 - Wednesdays 1:00pm~3:00pm or
 - by appointment through e-mail
 - Office: CS Building Room #2406



⊙ Teaching Assistants

- ◆ Heejin LEE (Head, Room #2408)
- ◆ Hye-Jin MIN (Room #2405)
- ◆ cs370@nlp.kaist.ac.kr

Jong C. Park

2

Symbolic Programming

Administrivia

⊙ Lecture Room

- ◆ EECS Building #1101 (#1 Lecture Room)
- ◆ Open-air lecture (once)

⊙ Lecture Hours

- ◆ Tuesdays and Thursdays
- ◆ 3:30pm~5:00pm

⊙ Course Homepage

- ◆ <http://nlp.kaist.ac.kr/~cs370>

Resources

⊙ Textbook

- ◆ Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, 3rd Edition, 2001.

⊙ Prolog

- ◆ SICStus Prolog, [version 3.12.7](#) (October, 2006)
 - SICStus 4 in beta test also available
 - adam: /usr/local/bin/sicstus/bin
- ◆ Manual
 - <http://nlp.kaist.ac.kr/~cs370/sicstus.html>
 - [html files](#), [pdf file](#)

⊙ BBS

- ◆ noah: course/symbolic

Goals

⊙ Lectures

- ◆ Experience the symbolic/declarative/logic programming paradigm through various paradigmatic data structures and their control methods with a number of pilot applications

⊙ Exercises

- ◆ Practice programming in the new paradigm
- ◆ Learn to devise evaluation metrics on demand

Goals

⊙ Homeworks

- ◆ Learn to design and program, focusing on
 - representational conciseness,
 - run-time efficiency, and
 - interface to other programming languages.

⊙ Term Project

- ◆ Creativity is the most important measure
- ◆ Practice presentation skills and teamwork

Evaluation

⊙ Point Breakdown (Total 5000 points)

- ◆ Attendance and Participation 15% (750 points)
- ◆ Exercises, Homeworks, Quizzes and Projects 40% (2000 points)
- ◆ Midterm Exam 20% (1000 points)
- ◆ Final Exam 25% (1250 points)

⊙ Notes

- ◆ Quizzes will be offered 4~5 times
- ◆ 50 points off for absence, 25 for lateness (per class)
- ◆ Serious recognition for no absence and no lateness

Course Schedule

⊙ Week 1: 2/27, 3/6

- ◆ Course Overview
- ◆ Introduction to Prolog

⊙ Week 2: 3/8, 3/13

- ◆ Syntax and Meaning of Prolog Programs

⊙ Week 3: 3/15, 3/20

- ◆ Lists, Operators and Arithmetic
- ◆ Using Structures: Example Programs

⊙ Week 4: 3/22, 3/27

- ◆ Controlling Backtracking
- ◆ Project: Identification

⊙ Week 5: 3/29, 4/3

- ◆ Input and Output
- ◆ More Built-In Predicates

⊙ Week 6: 4/5, 4/10

- ◆ Programming Style
- ◆ Project: Proposal

⊙ Week 7: 4/12

- ◆ Operations on Data Structures

Course Schedule

⊙ Week 8: 4/17, 4/19

- ◆ Midterm Exam

⊙ Week 9: 4/24, 4/26

- ◆ Basic Problem-Solving Strategies
- ◆ Best-First Heuristic Search

⊙ Week 10: 5/1, 5/3

- ◆ Problem Decomposition and AND/OR Graphs
- ◆ Project: Demo [1]

⊙ Week 11: 5/8, 5/10

- ◆ Expert Systems
- ◆ Project: Demo [2]

⊙ Week 12: 5/15, 5/17

- ◆ Planning
- ◆ Project: Demo [3]

⊙ Week 13: 5/22, 5/29

- ◆ Machine Learning
- ◆ Natural Language Processing

⊙ Week 14: 5/31, 6/5

- ◆ Game Playing
- ◆ Project: Final [1]

⊙ Week 15: 6/7

- ◆ Project: Final [2]

Successful Applications

⊙ **Source:** <http://www.sics.se/isl/sicstuswww/site/customers.html>

◆ Speech Applications

- On the International Space Station (ISS), astronauts execute thousands of complex procedures to maintain life support systems, check out space suits and conduct science experiments, among their many tasks. Today, an astronaut usually reads from a PDF viewer on a laptop computer, which requires them to shift attention from the task to scroll pages.
- Clarissa enables astronauts to be more efficient and to give full attention to the task while they navigate through complex procedures using spoken commands.
- Clarissa has been implemented mainly using SICStus Prolog and a speech recognition toolkit provided by Nuance Communications.

Successful Applications

◆ Telecom

- Ericsson Network Resource Manager (NRM) provides the capabilities for configuring and managing complex multi vendor IP Backbone networks.
- NRM assists the operator in making decisions when planning, configuring and making configuration changes. NRM offers an open system providing scripting interfaces and a language for defining validation rules allowing a great level of customization by the customer and by Ericsson's service organization.
- The SICStus Prolog has been very suitable in implementing this rule-based part of NRM as well in the early prototyping phase as in the later optimization phase.

Successful Applications

◆ Biotech

- SICS developed a dispensation order generation algorithm for Pyrosequencing's sequence analysis instruments, using SICStus constraint technology.
- The algorithm can be described as a compiler, which calculates an instruction sequence based on an input specification.
- Applications include genetics, drug discovery, microbiology, SNP and mutation analysis, forensic identification using mtDNA, pharmacogenomics, and bacterial and viral typing.

Successful Applications

◆ Logistics

- The US-based RedPrairie Corporation has introduced a real-time optimization engine, COPLEX, "... capable of managing a continuous flow of changes in orders, capacities and constraints dynamically, adjusting optimal consolidation solutions in real-time to achieve a quantum leap in cost savings for customers."
- The kernel of the engine is written in SICStus Prolog using its finite domain constraint solver library.

Successful Applications

◆ Data Mining

- Compumine AB's data mining software Rule Discovery System™ (RDS™) was implemented in SICStus Prolog.
- RDS™ is a powerful tool for generation of reliable, accurate, and interpretable rule based prediction models by automatically searching databases for significant patterns and relationships.
- RDS™ has been successfully applied to problems in a large number of data intensive areas such as pharmaceutical research, language technology, and engineering.

Project Ideas

⊙Visions

- ◆ NTT DoCoMo
 - 2003: [Link 1](#)
 - 201X: [Link 2](#)
 - Mobile Remote Learning System
 - E-Commerce & Delivering System
 - Mobile Town Monitoring System
 - Mobile Medical Examination System
 - Mobile Virtual Laboratory
 - One-Stop Boarding System
 - Bus On Demand System

Project Ideas

- 201X: [Link3](#)
 - Episode A
 - Mobile Check-in System
 - Mobile Entry
 - Dock-in Terminal
 - Episode B
 - Virtual-Reality Communications
 - Remote Medical Network
 - Traceability System
 - UniButton
 - Episode C
 - Personal Concierge
 - Security Robot
 - Remote Automation

Project Ideas

- Episode D
 - Child Confirmation System
 - Mobile Tutor
 - Mixed Reality
- ◆ What's yours?

Good luck to all of you!

