

Willow

RCOS Summer 2020

Mission Statement: To assist instructors in educating students about the purpose and usage of truth trees.



The “Team”

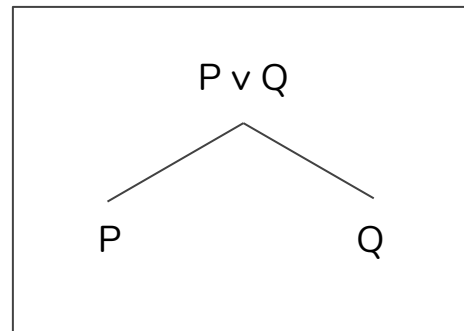
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Project Founder and Manager
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Want to work on Willow for RCOS? Look out for it in the spring semester...



Project Description

- **Truth trees:** visual method of solving the satisfiability problem
- Is there a truth assignment for some variables that satisfy (make true) some set of statements?
- Part of Willow is a public truth tree editing tool
- Another part gives course instructors a way to assign problems to students
 - Instructors can create courses, invite students, and give assignments
 - Truth trees are automatically validated and results are collected for the instructors



Truth trees use a “branching” technique to test truth assignments.



Technical Overview

- Server-side code is written in **Node.js**
 - Uses **Express.js** for the web server
 - Uses **node-postgres** to connect to the database
 - Database stores user information, course information, and assignments
- Client-side code written in **JavaScript**
 - Mostly uses **Vue.js**
 - Recursive components





Repository

- Our GitHub repository is located at: <https://github.com/connorjayr/Willow>
- The repository contains:
 - README with full installation instructions
 - Code of conduct
 - Contributing guidelines
 - License (MIT)
 - Issue templates
- Issue tracker used to track bugs and new features





Semester Goals

1. Support for authentication, instructor accounts, and courses
 - Securely store user credentials (researched hashing algorithms + salting passwords)
 - Establish workflow for promoting a user account to an instructor
 - Instructors can create courses, invite users to their courses, and give assignments
 - Assignments are autograded by the validator and results are compiled for the instructor
2. Code refactor
 - Improve efficiency of algorithms
 - Change tree data structure to make accesses more efficient (don't need to traverse the entire tree)
3. Additional logic features
 - Support first-order logic (for all, there exists quantifiers)
 - Add inference rules (modus ponens, hypothetical syllogism, etc.)
 - Add alternative decomposition rules



Semester Progress

- Connected web server to PostgreSQL database
 - Used to store sessions, user credentials, assignments, and course information
- Implemented secure authentication, registration of user accounts, and browser sessions
- Use nodemailer library to connect to SMTP servers and send out emails (course invitations, password resets, etc.)
- Design administration page; manage users and promote users to instructor status
- Code refactoring (front-end HTML/CSS; back-end algorithms)
- Documentation! (detailed installation instructions, contributing guidelines, issue templates, code of conduct, etc.)
- What's missing? Logic...



Vision/Next Steps

- Complete additional logic features planned at the beginning of the semester
- Work with instructors to make project usable in a classroom setting
- Expand team to get more input and alternative perspectives
- Research other usages of truth trees and integrate into the project, if applicable
 - e.g. formal proofs, logic visualization, etc.
- **VISION:** Willow will eventually become a tool that is intuitive to use and useful in a classroom setting by both instructors and students.

Live Demo



Questions?

