

# Homework Help Desk

## Tutors When You Need Them Most

### Project Highlights

- Real-time tutor matching modeled with linear programming
- Compatibility score = subject match + time match - price penalty
- Constraints: one tutor per student, capacity respected

### Technology Stack

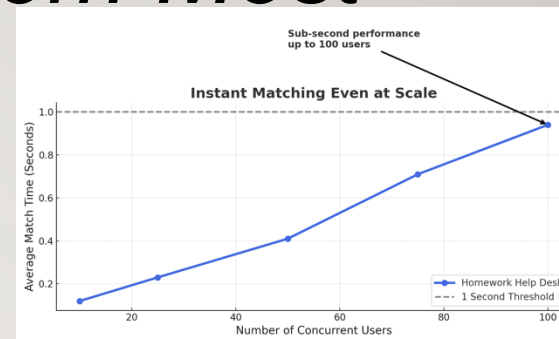
- Django backend (tutors, students, sessions)
- PostgreSQL for persistent storage
- PuLP + GLPK/CBC solvers for optimization

### Performance Insights

- Algorithm scales practically: growth rate  $\sim n^{1.49}$
- Solver handles 10,000+ possible match combinations in under 2 seconds during stress testing
- Sub-second matching for up to 100 users

### Why This Matters

- Delivers on-demand tutoring for students in need
- Fair pricing adapts to real-time demand
- Built to scale with future user growth



Homework Help Desk connects students with tutors in under one second, even with 100+ users active. Our matching algorithm uses linear programming to weigh subject fit, timing, and price, ensuring high-quality pairings instantly. This real-time performance sets us apart, delivering fast, tailored help exactly when students need it.

| request session                                                                                                                                                                                         | available tutors                                                                                                                                                                                                | matching results                                                                                                                                                                                                |
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| <p>Homework Help Desk</p> <p>Request a Tutoring Session</p> <p>Subject: <input type="text"/></p> <p>Time: <input type="text"/></p> <p>Price: <input type="text"/></p> <p>Request a Tutoring Session</p> | <p>Homework Help Desk</p> <p>Available Tutors</p> <p>John - Math - \$10/hr</p> <p>Jane - Science - \$10/hr</p> <p>Sam - English - \$10/hr</p> <p>Alice - Math - \$10/hr</p> <p>Mike - Programming - \$10/hr</p> | <p>Homework Help Desk</p> <p>Matching Results</p> <p>John - Math - \$10/hr</p> <p>Jane - Science - \$10/hr</p> <p>Sam - English - \$10/hr</p> <p>Alice - Math - \$10/hr</p> <p>Mike - Programming - \$10/hr</p> |