Grid Optimization (GO) Competition Challenge 1

Webinar: Introduction and Summary

February 5, 2019

This webinar is being recorded for instructional purposes.
Grid modernization requires software development modernization

- Modern Grid Challenges and New Opportunities for software
  - Increased variability / stochasticity from wind and solar, distributed energy resources
  - Decreasing stability and validity of steady state assumptions
  - Decentralization / millions of distributed assets
  - Power flow controllers

Grid software was designed for traditional resources and needs a significant update for the modern grid and emerging technologies.

- Storage
- Responsive demand

Competition: Identify breakthrough technologies & initiate overhaul of legacy management systems via a fair and transparent evaluation of innovative approaches.

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Fast evolving grid requires innovation in management systems / decision support tools

Deterministic

Thousands of Assets

Limited / Passive Power Flow Controllers

Stochastic / Model Uncertainty

Millions of Flexible Assets / Resources

Dynamically Updated Power Flow Controllers

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The heart of most grid software/optimization is Optimal Power Flow (OPF).
Software Environment

Languages
- C/C++
- GAMS
- Julia/JuMP
- Java/Scala
- Python
- MATLAB/MATPOWER
- Linux binary executables

Solver Libraries

Open Source
- CVX
- Ipopt
- MATPOWER

Sponsored
- GAMS
- Gurobi
- CPLEX
- MOSEK

Licensed
- MATLAB
- PowerWorld
- PSSE

See website for current versions and restrictions

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Competition Timeline

Start of Challenge 1; Original datasets released

Challenge 1 Trial Event 1 results released;
Trial 1 datasets released

Challenge 1 Trial Event 2 results released;
Trial 2 datasets released

Challenge 1 Final Event results released;
Final scores posted;
Top 10 teams in each Division announced

November 2018
December
January
February
March
April
May
June
July
August
September
October
November 2019

This webinar is being recorded for instructional purposes.
Building complexity throughout the competition

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Winning, Scoring, Divisions

Challenge 1

- **Division 1**
  - Real-Time (10 Min)
  - Lowest Cost
  - Top 10: $100k

- **Division 2**
  - Offline (45 Min)
  - Lowest Cost
  - Top 10: $100k

- **Division 3**
  - Performance Profiles
  - Top 10: $100k

- **Division 4**
  - Performance Profiles
  - Top 10: $100k
Upcoming Dates

Webinar 2 -- Platform interaction and entry submission: February 20, 2019

Webinar 3 -- File formatting and solution evaluation: February 21, 2019

Trial 1 registration deadline: April 1, 2019

Trial 1 submission window: April 1 – April 15, 2019

Trial 1 results posted: May 1, 2019
Website

https://gocompetition.energy.gov/

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Future Challenges

• Challenge 2:  
  • Extension of Challenge 1  
  • Anticipated Nov. 2019 - Nov. 2020

• Challenge 3: Stochastic Unit Commitment

• Challenges 4 and beyond  
  • Advances made possible by PMU data  
  • Cyber-threats  
  • Stability/Dynamics
Questions?

Good luck to all entrants!

For any further questions or comments, please contact us:

GO Competition Administration Team
Website: https://gocompetition.energy.gov
E-mail: arpacomp@pnnl.gov

This webinar is being recorded for instructional purposes.
Stay Informed!

- Keep informed of the latest competition information
  - As Challenge 1 approaches, the website will be frequently updated with new information

- Forums are available on the GO Competition Web Portal
  - ARPA-E announcements
  - Community communication
  - Challenge discussions
  - Submission process
  - Performance issues
  - Scoring discussions
  - Website issues

- Contact us via the GO Competition Web Portal

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Competition Platform Components

- GitHub
  - SSH key
  - Repo clone
  - Dataset/Time Libraries
  - Solution
  - Evaluation
  - Objective value & constraint details

- Docker Container
  - Score, Results URL
  - SubmissionID.tar.gz (solutions, evaluation results, scoring info.)

- Repo, Dataset/Time, Language
- Registration
  - Individuals
  - Teams
- Submission Results
- Leaderboards
- Challenge Information
  - Problem Description
  - Input files and format
  - Output files and format
  - Evaluation and scoring
- Competitions
- FAQs
- Forum
- News
- Definitions

- References
  - Getting started
  - Solvers
  - Languages
  - Platform
  - GitHub
  - Docker
  - How to register; create a team; submit
  - Rules
  - Background
  - Inspiration
  - Timeline
  - Prizes

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