StarExec

Design Abstractions, Demonstration

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StarExec: Shared Logic-Solving Infrastructure

• **Web service** for
  • Hosting benchmark libraries
  • Running competitions
  • Evaluating solvers

• **Users can**
  • Upload solvers, benchmarks
  • Run jobs on compute cluster (200 nodes planned)
In this talk

- Design abstractions in StarExec
- Demo

http://www.starexec.org
Primitives

- Benchmarks
- Solvers
- Jobs
- Users
Spaces

Contain primitives, subspaces
Communities

• For different kinds of logic solvers
  • TPTP, SMT, SAT, etc.

• Communities are special spaces

• Other spaces are subspaces

• New community members get a private subspace
Permissions

- Add and remove
- For spaces and primitives
- **Space Leaders** control access
Community Leadership

• Approve new members
• Provide benchmark validators, job post-processors
• Set community defaults for jobs
Benchmarks

• Upload via a .zip archive
• Creates parallel space structure
• Benchmarks validated on upload
• Validators can extract attributes
  • key-value pairs
  • e.g., subvariety of logic, expected result (sat/unsat), other characteristics
Solvers

- Can have multiple configuration scripts
- Configurations invoke actual solver

```bash
#!/bin/bash
./z3 -smt2 $1
```
Running a Job

• Jobs initiated within spaces
• Job-pair = 1 solver on 1 benchmark
• Multiple ways to collect job-pairs from space hierarchy
• Job-pairs dispatched to compute nodes
• Results collected incrementally
Job Results

• Solver output post-processed for attributes
• Job results can be downloaded
  • .zip files, Excel spreadsheets
• All outputs from solvers, or
• All attributes collected
System Design

- **Head nodes**
  - Run web service
  - Send jobs to compute nodes

- **Compute nodes**
  - execute job-pairs

- Networked storage
Compute Nodes

• 32 Hewlett-Packard SL230s with:
  – 2 Intel 2.4GHz quad-core processors
  – 128 GB RAM
  – 1TB local disk
• Funds for around 150-200 nodes total
Technologies

- Front end: JSP, Javascript/jQuery
- Backend: Java, MYSQL
- Apache Tomcat as web server and servlet container
- Oracle GridEngine to schedule job-pairs.
Status

• First hardware purchase
  • 3 head nodes, 32 compute nodes
  • NetApp storage (mirrored 22TB)

• Software almost ready

• Public release this fall

• Demo today on dev cluster
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● Todd Elvers, Clifton Palmer, Vivek Sardeshmukh, Skylar Stark, Ruoyu Zhang
● JJ Urich, Hugh Brown (sys admin)
Demonstration

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