TheoSSA on AstroGrid-D

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and the GAVO and AstroGrid-D Teams
Introducing AstroGrid-D

- BMBF-sponsored Grid-Project to establish the infrastructure for the German Astrophysical Community
- Part of the German D-Grid initiative
- Members: AIP, ZAH, AEI, TUM, ZIB
- Middleware: GT4.0x
- ~900 nodes in clusters, ~100TB storage space,
- Special Hardware: Robotic Telescopes, soon also a “GrayWulf” type storage server
- information server StellarIS, GridWay, Portals, Data Streams
- 10 implemented use cases of different complexity
- almost 100 registered users, Mh of CPU usage
Introducing GAVO

- BMBF-sponsored German “Virtual Observatory” project
- part of the IVOA initiative to standardise metadata, protocols and methods of data publication
- partners: ZAH, AIP, MPA, TUM, IAAT, Univ. Bonn
- multiple projects with the German Astrophysical Community
- data center, participation in surveys, standard development
- focus on theoretical astrophysical data (Millenium database, data models)
TheoSSA: Science and Virtual Observatory
Scientific motivation

• modelling of high temperature stars (>10,000K, white dwarfs)
• complex spectra, highly specialised field (NLTE-spectra)
  → GAVO task: Create a simple interface to access numeric simulation results of HT spectra
  → allowing for a choice of parameters for atomic data
VObs Service TheoSSA

- based on the Tübingen NLTE Model Atmosphere Package *TMAP*
- provides
  - Spectral Energy Distributions (SEDs)
    *TheoSSA* ([http://vo.ari.uni-heidelberg.de/ssatr-0.01/TrSpectra.jsp](http://vo.ari.uni-heidelberg.de/ssatr-0.01/TrSpectra.jsp))
  - Simulation Software
    *TMAW* ([http://astro.uni-tuebingen.de/~TMAW/TMAW.shtml](http://astro.uni-tuebingen.de/~TMAW/TMAW.shtml))
  - Atomic Data
    *TMAD* ([http://astro.uni-tuebingen.de/~rauch/TMAD/TMAD.html](http://astro.uni-tuebingen.de/~rauch/TMAD/TMAD.html))
- using the IVOA *Simple Spectral Access protocol* (SSAP)
- in three complexity levels depending on scientific demands

TMAW Request

Please specify:
- effective temperature $T_{\text{eff}}$,
- surface gravity $\log g$,
- abundances for H, He, C, N, and O, as well as your e-mail address.

A NLTE model atmosphere according to your input will be calculated by TMAP - the Tubingen NLTE Model-Atmosphere Package and the results (this may take a while) will be sent to the given e-mail address.

Model-Grid Parameters

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<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Grid spacing</th>
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<td>20000</td>
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<tr>
<td>$\log g$ [cm/s$^2$]</td>
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<td>Abundances [mass fractions]:</td>
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<tr>
<td>H</td>
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<tr>
<td>He</td>
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<td>C</td>
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<tr>
<td>N</td>
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<td>O</td>
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Presently, only SEDs of hot, compact stars can be calculated. This WWW interface is still in a test phase and thus, errors may still occur. We will check for these asap. However, do not hesitate to start any calculation - this helps us to further improve the TMAW procedure.

Please do not hesitate to contact us in case of any questions.
TheoSSA: Grid elements
Why use a Grid?

- CPU time increases with number of considered elements (hours to weeks)
- Grid can scale according to demand
- Higher reliability (backup resources)
- Middleware offers additional options: Job monitoring, statistics, error handling
- TMAP is comparatively easy to compute:
  - No interprocess-communication
  - No complex compilation, all libraries supplied
• Compute resources are retrieved from the MDS (monitoring and discovery service)
• The Job is submitted using a JSDL template
• GT4.0x: with prior RSL translation via xsltproc
• Data transfer uses gsiftp, the job staging process is based on GT4 web services (globusrun-ws)
• all written in a two-page shell script
Task farming with Globus

- Database
- GAVO service
- model input
- executable
- JSDL template
- list of resources (nodes available)
- Job submission
- host
- output

Web Interface
Conclusions

- TheoSSA combines advantages of a VObs standardised interface with the compute power of the Grid (“VObs on top”)
- Serves as a good example use case
- It presents SEDs of hot compact stars to the community and the VObs
Future Steps with EGEE

- AstroGrid-D project time has officially ended
- All D-Grid community projects were focused on national Grid infrastructure
- project is now carried by the participating institutes; ongoing applications
- interest for international collaboration
- participation in EGEE A&A Cluster (and EGI)
- gateway between AGD and EGEE
- “atomic” task farming as a test case
Thank you for your attention!