

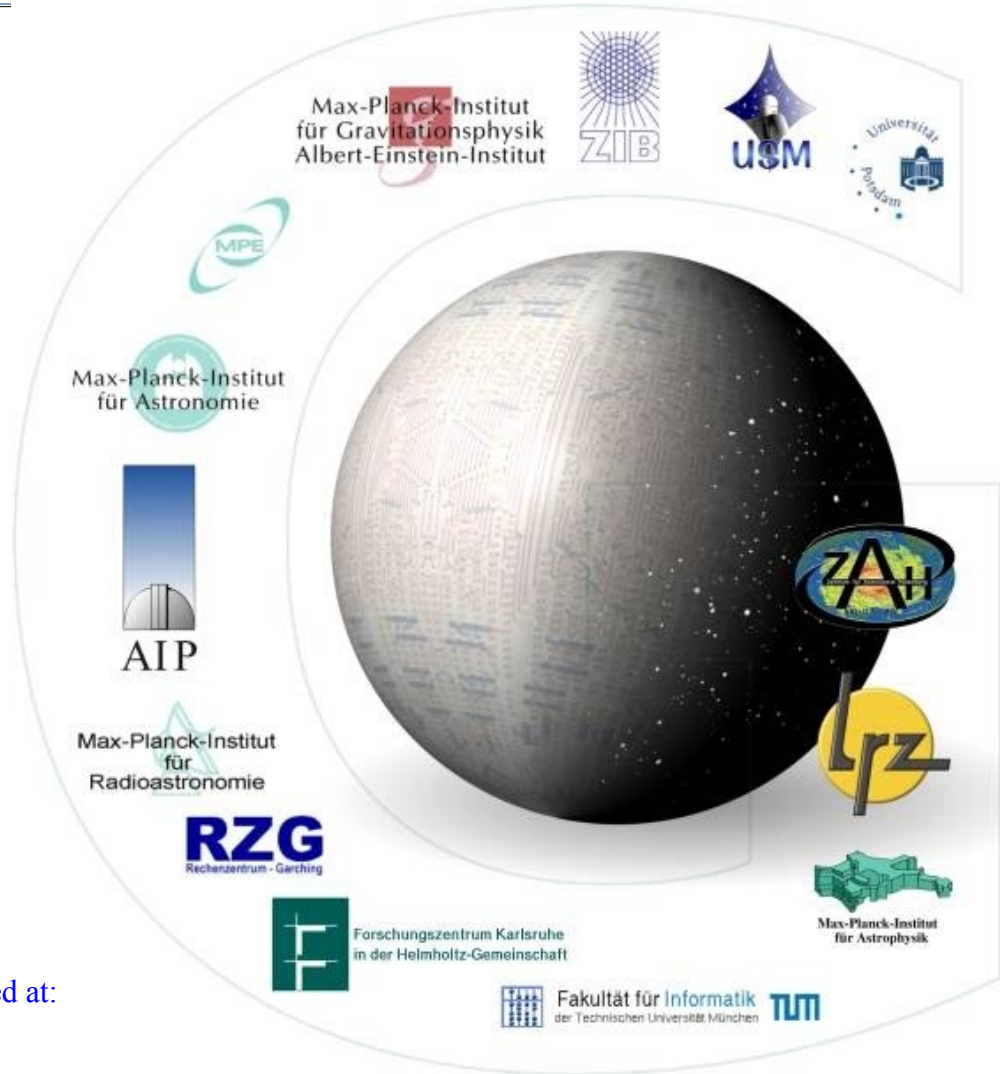


AstroGrid-D

Use Case NBODY6++

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NBODY6++ is public domain. Sources can be downloaded at:
<ftp://ftp.ari.uni-heidelberg.de/pub/staff/spurzem/nb6mpi>





NBODY6++ Use Case

Direct N-body Simulations of collisional star clusters (globulars, young dense, around galactic central black holes).

Features: High Accuracy, individual time steps, 4th order Hermite time integrator.

NBODY6++ is a special Variant of NBODY6 for massively parallel supercomputers using Message Passing Interface (MPI)

Can make use of special purpose Hardware (GRAPE)

Native Fortran77 Application with extensions using MPI Message Passing Libraries and C-Preprocessor

Runs on different (Unix) Architectures/Compilers



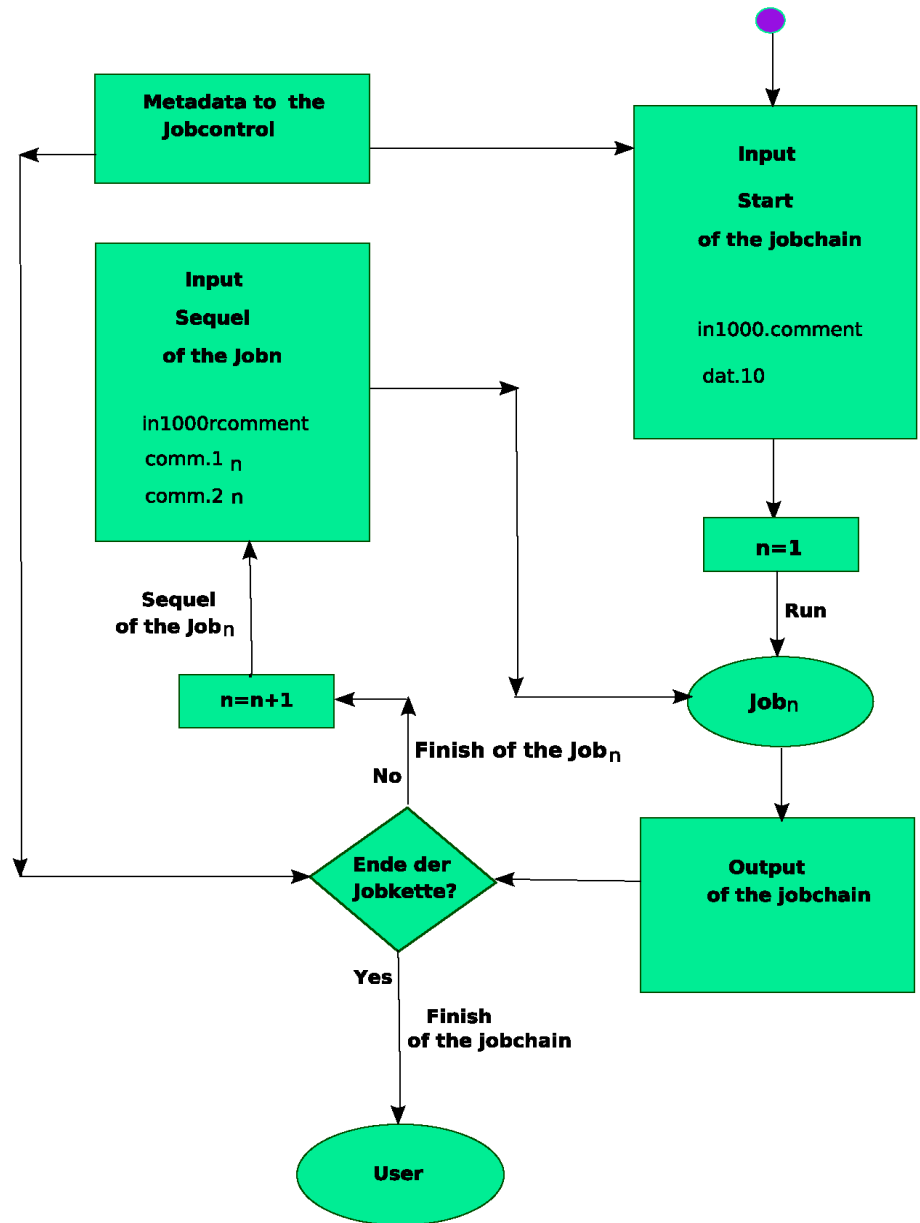
Job Control Flow

Read simulation parameters from Std. Input (in1000.comment)

Checkpoint functionality: Start a new run or restart from a common-block file (comm.1/comm.2)

Writes diagnostics to Std. Output

Writes binary & ASCII Files during Execution
(depends on Input Parameters)





Running NBODY6++ on AstroGrid-D

JSDL

```
<?xml version="1.0"?>
<jsd1:JobDefinition xmlns="http://www.gacg-grid.de/namespaces/job-mgmt/2006/08/jsdl"
  xmlns:jsdl="http://schemas.ggf.org/jsdl/2005/11/jsdl"
  xmlns:jsdl-posix="http://schemas.ggf.org/jsdl/2005/11/jsdl-posix"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <jsd1:JobDescription>
    <jsd1:JobIdentification>
      <jsd1:JobName>
        Example NBODY6++ run
      </jsdl:JobName>
      <jsd1:Description>
        Example of use/JSDL with UC3 (NBODY6++)
      </jsdl:Description>
      <jsd1:JobProject>
        n/a
      </jsdl:JobProject>
    </jsdl:JobIdentification>
    <jsd1:Application>
      <jsd1:ApplicationName>nbody6</jsdl:ApplicationName>
      <jsd1:ApplicationVersion>06.2003</jsdl:ApplicationVersion>
      <jsd1:Description>JSDL lacks a JobType element, NBODY has to run as a single process.</jsdl:Description>
      <jsd1-posix:POSIXApplication>
        <jsd1-posix:Executable>nbody6</jsdl-posix:Executable>
        <jsd1-posix:Input>in1000.comment</jsdl-posix:Input>
        <jsd1-posix:Output>nbody6.out</jsdl-posix:Output>
        <jsd1-posix:WorkingDirectory filesystemName="HOME"></jsdl-posix:WorkingDirectory>
        <!-- example: setting an environment variable (not required for NBODY6) -->
        <jsd1-posix:Environment name="MY_VAR">value</jsdl-posix:Environment>
        <jsd1-posix:WallTimeLimit>600</jsdl-posix:WallTimeLimit>
        <jsd1-posix:MemoryLimit>5000000</jsdl-posix:MemoryLimit>
      </jsdl-posix:POSIXApplication>
    </jsdl:Application>
    <jsd1:Resources>
      <jsd1:FileSystem name="HOME">
        <jsd1:Description>
          User's home directory
        </jsdl:Description>
      </jsdl:FileSystem>
      <!-- Other well-known filesystems are: SCRATCH, ROOT and GLOBUS_LOCATION -->
      <!-- custom FileSystem example: -->
      <jsd1:FileSystem name="nbody_location">
        <jsd1:Description>
          NBODY6++ files
        </jsdl:Description>
        <jsd1:MountPoint>
          /home/Hya/tbruese/nbody6
        </jsdl:MountPoint>
      </jsdl:FileSystem>
    </jsdl:Resources>
  </jsdl:JobDescription>
</jsdl:JobDefinition>
```





Running NBODY6++ on AstroGrid-D

JSDL must be translated to RSL which is understood by Globus.

```
jsdlproc nbody6.jsdl > tmp.rsl
```

Submitting atomic job using WS-GRAM

```
globusrun-ws -submit -staging-delegate\  
-job-description-file tmp.rsl -F <globushost>
```



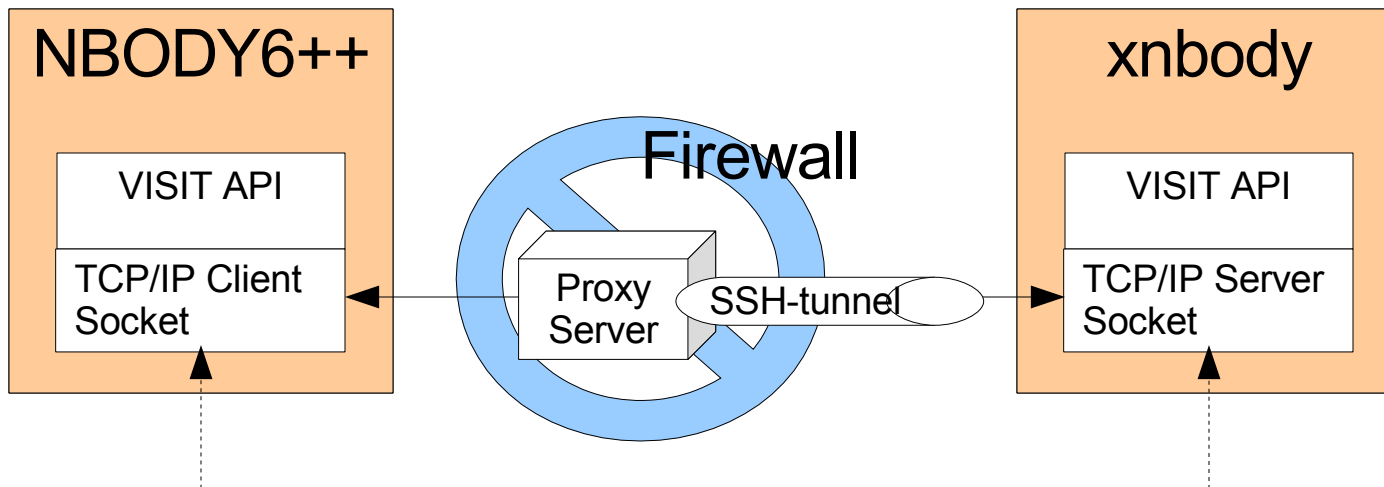
Online Visualization with xnbody

Needs NBODY6++ with VISIT support

VISIT is an easy to use toolkit for monitoring and steering of simulations

Simulation

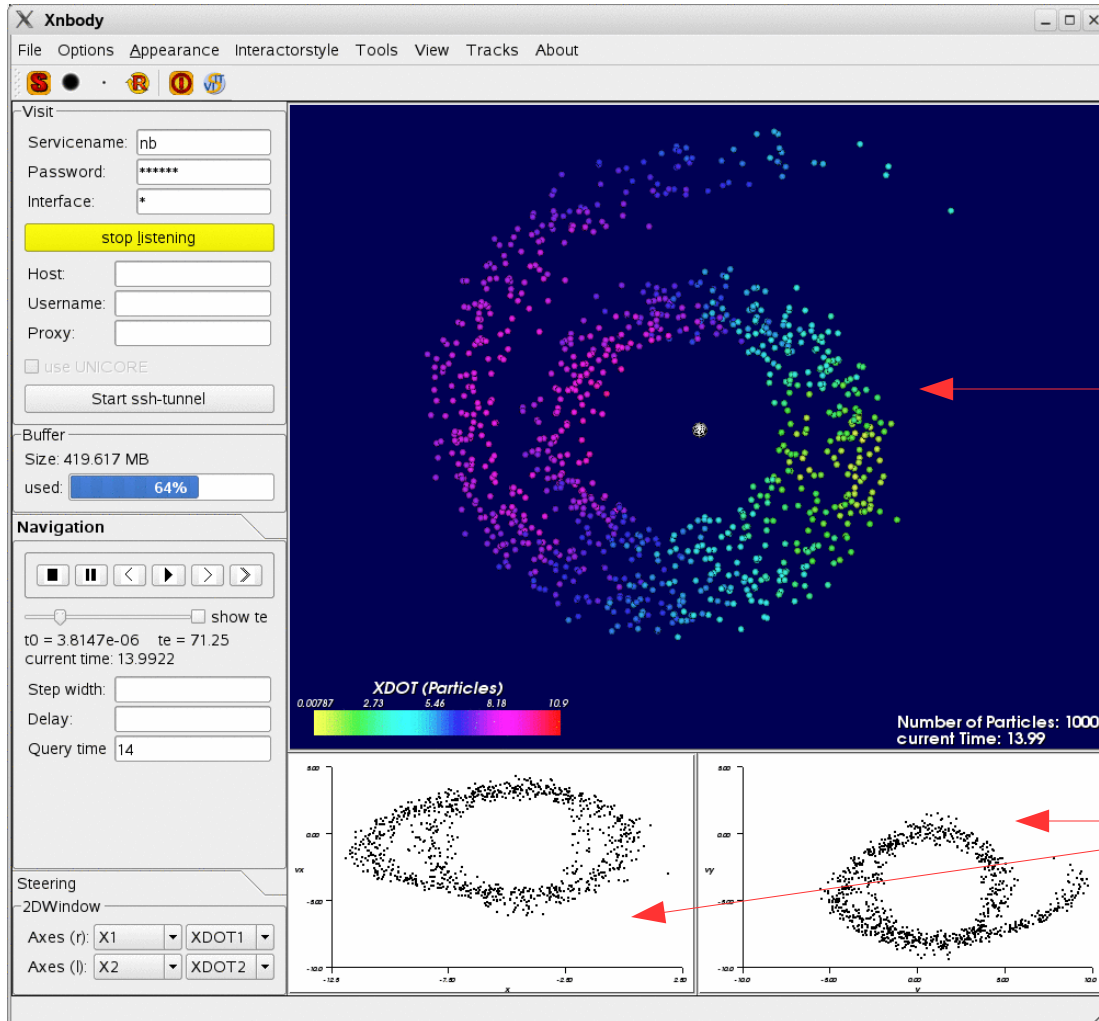
Visualization



If no firewall is between the sockets, direct socket communication can be used



Online Visualization with xnbody



xnbody: NBODY6
Visualization

3D View
• Rotate
• Zoom

Configurable 2D
Views