New resource allocation service in GridNNN

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GRAM service in GT4/5

- Register task on the resource
- Stage-in/out files
- Transfer task to local resource manager
- Monitoring task
- Manage task (for example cancel the task)
- ... and more

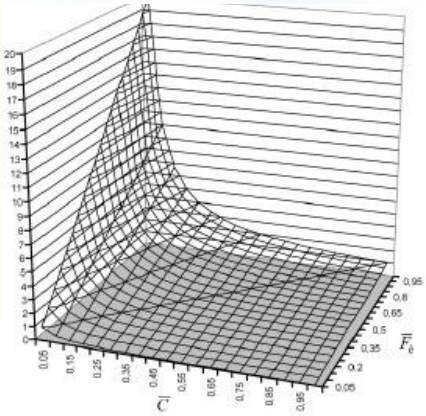
GRAM GT4

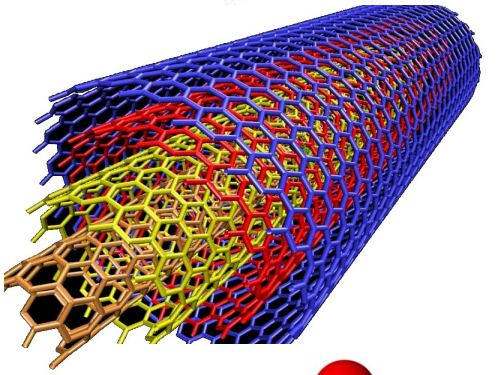
- GT4
  - WSRF service
  - WS-MDS as a information system
- GT5
  - Really this is reincorporation of GRAM GT2

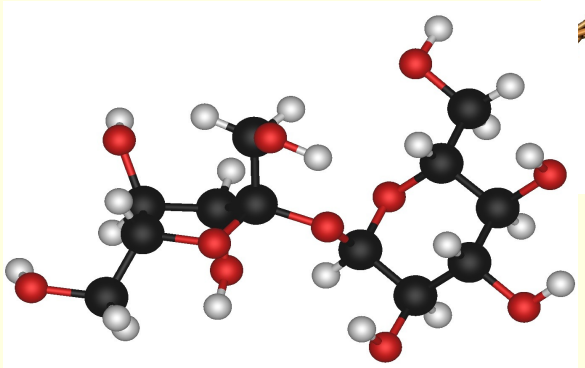
GridNNN

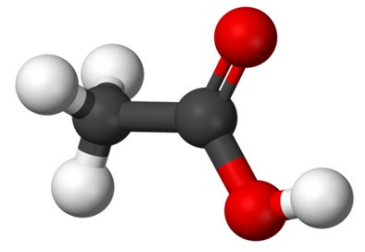
Project was started in 2008.

- Main target if the GridNNN is to provide access of scientists and engineers to the supercomputer resources of National Nanotechnology Network
- This is computational grid
- Joint supercomputers
- Application area is nanotechnology, aero- and hydrodynamics







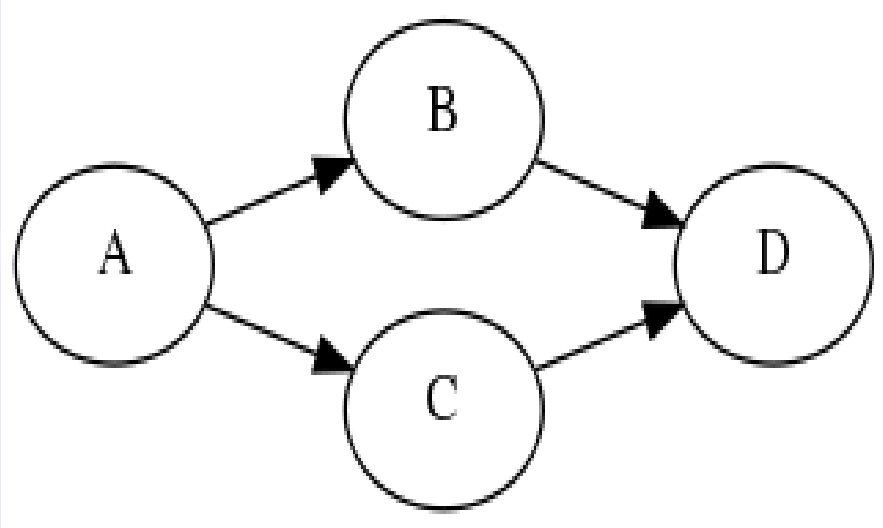


GridNNN

- The main object which GridNNN manipulate is job.
- The job describes by direct acyclic graph (DAG)
  - vertexes are a set of tasks
  - edges are logical dependencies among them.
  - Each task must be executed on some single resource (supercomputer). So it consider as an atomic object on the grid level.
- This interpretation of task is very close to the interpretation of the similar object in other grid project, for example EGI/WLCG.

Job structure in GridNNN

```
{ "version": 2,
  "description": "task description",
  "tasks": [ { "id": "a",
               "children": [ "b", "c" ]
             },
             { "id": "b",
               "children": ["d"],
             },
             { "id": "c",
               "children": ["d"],
             },
             { "id": "d",
             }
           ],
}
```

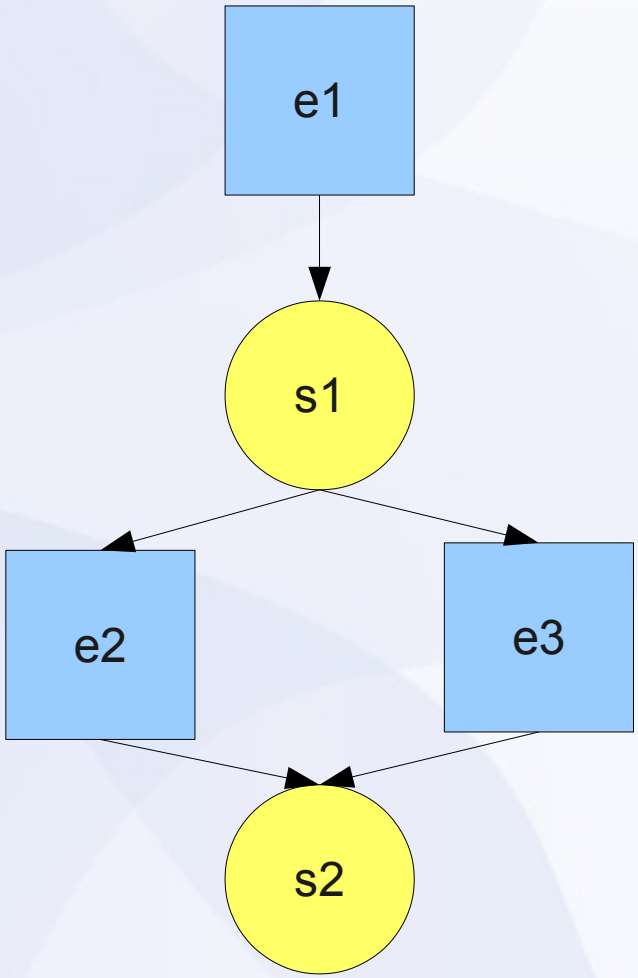


New concept of task

- We consider the task as a composite object which is DAG itself.
- The vertexes of this graph may be two types.
  - First type vertex is a executable object which can be submitted to local resource manager and execute.
  - The second type is an auxiliary vertex which define some action on the grid-gate where service are working.
  - The set of such vertex is limited and should be predefine by system administration of the service.
- Second type of vertex is realized as a plug-ing component of the service with clear and simple API.

New task structure

- Two set of vertexes
  - Execution vertex (e1,...)
  - Service vertex (s1,...)
- Example: select execution module (e2, e3) depends on success e1.
  - [“RC > 0”, e2, e3]



Problem of compilation of parallel task

- It is necessary compile parallel program on the same resources where it should execute
- Special node for compilation (not in common pool working node)
- Current infrastructure can not do it because after completion task all information delete.
- In new approach just chain of subtask: compilation -> execution

Conclusions

- In the present time we have prototype of the allocation service which is under testing.
- It provide full set of services which has necessary functionality like authentication, authorization, information service, accounting, submission service and others.
- The service can also be used by user to remote access to supercomputer resources directly. So it can be adopted to non-grid distribution calculation.