User Program Development Tools for the Grid (UPDT)
UPDT Research Group Charter (Draft)
April 11, 2003

1 Group Name

User Program Development Tools for the Grid
Group Acronym: UPDT

1.1 Research Group Organization:

1.1.1 Chairs

- Susanne M. Balle (Susanne.Balle@hp.com)
- Bob Hood (rhood@nas.nasa.gov)

(Additional founding participants)

- Kate Keahey (keahey@mcs.anl.gov)
- David LaFrance-Linden (David.LaFrance-Linden@hp.com)
- Sergiu Sanielevici (sergiu@psc.edu)
- Etc.

1.1.2 Secretary

- Susanne M. Balle (Susanne.Balle@hp.com)

1.1.3 Mailing List

- Mailing list: grid-programming-tools@nas.nasa.gov
  - Majordomo-based signup
- Archive URL (TBD)

1.2 Description and Objectives

The **User Program Development Tools** (UPDT) **for the Grid** Research Group (RG) complements other GGF groups by investigating grid-enabled tools such as debuggers, performance-tuning tools, etc. which allows the grid user to, interactively or not, better understand the behavior of his application. During the program development cycle the user prototypes, implements, debugs and tunes his application. The UPDT RG is concentrating on the latter two steps in the cycle.

1.2.1 Focus/Purpose:

Development tools such as debuggers and performance tuning tools are essential for users to understand why their application is not giving them the results they expected or why they are not getting the expected performance. Many tools already exist and are supported in a cluster environment. Users are already accustomed to having such tools available to them. As users want to grid-enable their applications or write a new application from scratch they will need all the help they can get to better understand the pitfalls to avoid when preparing their application for the Grid. Most users aren't yet used

to developing grid-enabled programs for homogeneous systems. Their task is further complicated since many Grids consist of heterogeneous systems. Development tools are essential in the program development cycle to minimize debugging time as well as performance tuning time in a Grid environment. The UPDT RG will survey users to figure out what program development tools they need to be able to write programs for the Grid.

Tool developers face a big challenge when dealing with very large, distributed, Grid systems. The possible heterogeneity of such systems further complicated their task. The UPDT RG will investigate grid-enabled tool requirements as well as create a document or extend existing documents listing the known problems with developing tools for large, distributed, and heterogeneous systems.

A large set of program development tools has common requirements. Examples of such a requirement are tools hooks into launchers such as globus, mpich (globus flavor), LSF, PBS, etc. The UPDT RG will specify functional requirements as well as provide examples from prior-art as templates. We will seek vendors to meet these requirements. The goal of the requirement specification is to provide Grid-enabled tool developers with a functional requirement guideline, which allows them to perform their task easier.

As Grid-services evolve, the UPDT RG will investigate and try to better understand the framework of a grid-service user-programming environment including grid-service enabled user program development tools.

Impact:

Architecture:
UPDT will affect this area with specifications for the minimum grid requirements for supporting tools.

Deployment and Operations:
Grid resource providers will need to deploy services, user programming tools, and infrastructure to accommodate UPDT's requirements.

Security:
Single secure login mechanisms as well as being able to perform non-trivial tasks in a distributed secure environment (where user ids could be different across systems) are two very essential requirements for user program development tools.

Application Development & Runtime Issues:
Vendors and Grid resource providers should support and implement UPDT's Grid tools's functional requirement specifications.
Users will have shorter program development cycle since their debugging and performance-tuning cycle should be reduced considerably if tools vendors implement UPDT's proposed tool requirements.

Scalability:
Scalability of Grid program development tools is an essential requirement for these tools to be successfully used by Grid program developers.

1.2.2 Context

The Applications, Programming Models and Environments (AMPE) roadmaps describe how each of the RGs and WGs within AMPE solve problems, which contribute to AMPE reaching its end goal.

One of the goals of this RG is to facilitate the building of programming tools for grid applications. If grids are to be successful, then there must be help for application programmers beyond what is available on machines today. While an integrated programming environment (IDE) that assists in all aspects of producing efficient grid programs may be highly desirable, it is a goal beyond our short-term reach. Instead the UPDT RG group will concentrate on delivering and facilitating stepping-stones toward that IDE:

- Analysis of user requirements and
- Analysis of likely implementation stumbling blocks

It is then expected that a follow-on group would tackle follow-on topics such as

- Protocol definitions for programming tool services needed for debugging and performance analysis,
- Etc.

For more information see the AMPE roadmaps.

1.2.3 Goals and Milestones

The UPDT RG will initially focus on generating documents analyzing both user and tool requirements for program development tools for the Grid (such as debugger, performance tuning, etc.). The group will create a list or extend existing lists discussing the known problems with developing program development tools for Grid systems.

A major goal for this RG is to specify program development tools' common functional requirements such as tools hooks into launchers such as globus, mpich (globus flavor), LSF, PBS, etc. We'll seek vendors to meet these requirements.

The UPDT RG will be generating documents analyzing how user program development tools will integrate with web-services or grid-services. We are interested in understanding the framework of a grid-service user-programming environment including grid-service enabled user program development tools. In the following list of deliverables and activities the ✓ symbol means the tasks are completed.

1. ✓ October 2002 – GGF6 – BoF Session to re-iterate interest
    a. ✓ Discuss draft charter and formation of the UPDT Research Group.
    b. ✓ Discuss the needs of current Grid users in terms of "user program development tools" (UPDT): debugger, performance tuning, etc.
    c. ✓ Develop a survey
        - UPDT Grid users' requirement survey.
2. ✓ November 2002 -- February 2003 –
    a. ✓ Distribute UPDT Grid users' requirement survey and collect responses for analysis.
3. ✓ March 2003 – GGF7 –
    a. ✓ Discuss latest charter of the UPDT Research Group.

b. ✓ Discuss proposed roadmap as well as roadmap concept.

4. March – June 2003 –
    a. Ratify RG charter before GGF8
    b. Continue to collect responses from the UPDT Grid users' requirement survey for analysis.
5. June 2003 – GGF8 –
    a. Organize a full day workshop (topic TBD)
        - Joint with the Application group.
        - Will result in a GGF document describing the workshop and its contributions
    b. UPDT users' requirement survey
        - Present and discuss UPDT users' requirement survey responses.
        - Initiate completion of UPDT users' requirement survey into a GGF document.
    c. Develop a survey
        - "Known problems with creating program development tools for Grid systems" survey.
6. July 2003 – Fall 2003
    a. Distribute "Known problems with creating program development tools for Grid systems" survey and collect responses for analysis.
7. October 2003 – GGF9 –
    a. Organize a full day workshop (topic TBD)
        - Will result in a GGF document describing the workshop and its contributions
    b. UPDT user tools survey GGF document completed
    c. "Known problems" Survey
        - Present and discuss "known problems with creating program development tools for Grid systems" preliminary survey responses.
        - Initiate completion of the "known problems with creating program development tools for Grid systems" survey into a GGF document.
8. February 2004 – GGF10 --
    a. "Known problems with creating program development tools for Grid systems" survey GGF document completed.
    b. Initiate discussion regarding user program development tools' common requirements such as hooks into launchers, etc.
9. June 2004
    a. Organize a full day workshop (topic TBD)
        - Will result in a GGF document describing the workshop and its contributions
10. October 2004
    a. Organize a full day workshop (topic TBD)
        - Will result in a GGF document describing the workshop and its contributions
11. March 2005

a. Complete informational GGF document on tool service protocol
b. Develop new goals and deliverables for continued RG activity.

- http://www.kvasar.com/GGF/GGF_UPDT.html