Software Engineering Project (2IP40)

Project Group 1

User Requirements Document

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Abstract

This document contains the user requirements for the SPINGRID environment system. This project is one of seven assignments for the course 2IP40 at Eindhoven University of Technology.

These user requirements were established according to requests formulated by Mark ter Linden and Hans de Wolf of Dutch Space. The document complies with the User Requirements Document (URD) from the Software Engineering Standard, as set by the European Space Agency [RD_1].
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Chapter 1

Introduction

1.1 Purpose

The purpose of this document is to specify the requirements of SPINGRID in a clear and consistent manner.

1.2 Scope

The software implements a computational grid. This grid is able to execute jobs when it receives an application accompanied by a set of data files. By hiding the complexity of grid technology which makes the system easy to use. Usability is also increased by offering a web-based front-end for users to access the system.
### 1.3 List of definitions and abbreviations

#### 1.3.1 Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Application</td>
<td>A non-interactive data processing application consisting of executables, scripts and/or auxiliary data files that reads one or more input data files and writes one or more output files.</td>
</tr>
<tr>
<td>Application provider</td>
<td>See section 2.4</td>
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<tr>
<td>Computational Grid</td>
<td>A hardware and software infrastructure that enables coordinated resource sharing within dynamic organizations consisting of individuals, institutions and resources.</td>
</tr>
<tr>
<td>Data provider</td>
<td>See section 2.4</td>
</tr>
<tr>
<td>Dispatcher</td>
<td>A dispatcher acts like a server and manages the distribution of jobs over the computational grid.</td>
</tr>
<tr>
<td>Job</td>
<td>Specification of application, configuration data, input and/or output data files and scheduler specific data (priority, preferred resource, etc).</td>
</tr>
<tr>
<td>Job provider</td>
<td>See section 2.4</td>
</tr>
<tr>
<td>Project</td>
<td>A collection of jobs with specified access rights to which users (project members) can be assigned.</td>
</tr>
<tr>
<td>Project administrator</td>
<td>See section 2.4</td>
</tr>
<tr>
<td>Role</td>
<td>The actions and activities assigned to or required or expected of a person.</td>
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<tr>
<td>SPINGRID</td>
<td>A computational Grid using SPINGRID software.</td>
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<tr>
<td>SPINGRID software</td>
<td>Software developed by Dutch Space and TU/e to build computational Grids for distributed data processing.</td>
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<tr>
<td>SPINGRID system</td>
<td>The full name of the entire system.</td>
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<tr>
<td>System administrator</td>
<td>See section 2.4</td>
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<tr>
<td>Resource provider</td>
<td>See section 2.4</td>
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<tr>
<td>User</td>
<td>See section 2.4</td>
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#### 1.3.2 Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>NAT</td>
<td>Network Address Translation</td>
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<td>URD</td>
<td>User Requirements Document</td>
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<td>XML</td>
<td>eXtensible Markup Language</td>
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1.4 References

RD_1  ESA Software Engineering Standards, ESA PSS-05-0, Issue 2, February 1991
RD_2  Job Submission Description Language (JSDL) Specification, Version 1.0, November 2005
RD_3  BSSC 2005(1), Java Coding Standard, Issue 1.0, March 2005
RD_4  SPINGRID-DS-TN-002, Issue 1, January 2006
RD_5  E-mail Mark ter Linden, ”Spidergrid User Requirements”, January 9 2006
RD_6  Minutes of meeting, January 19 2006

1.5 Overview

This document is structured according to the standard described in [RD_1].

Chapter 2 gives a general description for SPINGRID. It describes the product, the capabilities and the characteristics of the users and the environments it is going to operate in. Chapter 3 describes a set of use cases. Chapter 4 describes specific requirements for SPINGRID.
Chapter 2

General Description

2.1 Main goal

The SPINGRID system provides users with an execution environment that can be used to process massive data jobs. This environment is actually a computational grid consisting of computer systems made available by users.

2.2 General capabilities

The SPINGRID system is a GRID designed to execute computations on idle computers. A computation uses resources like applications, files with data and a computer to get a result. The person that submits a computation will not have to specify the specific resources and does not have to deal with security. To him this particular GRID will appear like one big computational device.

A computation exists within a project. In a project are also members, they can add a job. And in a project there is a leader, he can manage the project.

The SPINGRID system enables the submitter of a computation to monitor and stop one of his running computations, and to retrieve the result of one of his completed computations.

The SPINGRID system will make sure that nobody can access your private things without your (implicit) permission. An application provider can restrict access for projects. He can also define which computers may be used as resources using his applications. This way, nobody can “steal” the application. A data provider can restrict access to projects. He can also define which computers may be used as resources using his data. This way, nobody can “steal” the classified data. A project administrator can set which computers he allows to be used by jobs within his project. This way nobody can get information on his project, and “bad resources” are also excluded by this. Bad resources could be computers of persons that want to mess up the project, or distribute some form of malware. A resource provider can restrict access of application providers. By this he excludes applications that may be dangerous (like spyware or malware). Also, he can restrict access to projects, so that a certain project member can become a resource provider just to support his own project.
The system has a web-based front-end, for submitting a computation or monitor its progress in an easy manner. It will also have a shell interface, so that it is possible to use the system using shellscripts.

The SPINGRID software for resource providers will be easy to install.

2.3 General Constraints

The quality of the SPINGRID system is primarily constrained by the amount of time the project team has available as well as by the presence of a few deadlines.

2.4 User characteristics

2.4.1 Users

The following roles will exist in the SPINGRID system; Mind that a user can have one or more roles.

- **System administrator**: The system administrator oversees the entire SPINGRID system and has the right to configure the system, to create and remove projects and assign and remove project administrators.

- **Project administrators**: The project administrators administrate projects and can assign and remove job providers, configure a project and restrict access for resource providers.

- **Job providers**: Job providers are users that offer a job to a project. They have to be a member of that particular project.

- **Data providers**: A data provider can offer a set of datafiles to the SPINGRID system. They can restrict access for projects and for resource providers to their datafiles.

- **Application providers**: An application provider can offer a set of applications to the SPINGRID system. They can restrict access for projects and for resource providers to their applications.

- **Resource providers**: Resource providers are users that offer time on their computers to the SPINGRID system. They can restrict access to their computer for application providers and projects.

The roles are visually presented in 2.1.

The relationships between the system and the users are visually shown in Figure 2.2. As shown there, only a project administrator and a job provider are associated with a project. The other roles are not (perse) associated with one project.
CHAPTER 2. GENERAL DESCRIPTION

Figure 2.1: Definition of the roles, arrow means “subset of”.

Figure 2.2: Definition of relationships between users and the system.
2.4.2 Trust model

The SPINGRID system offers his users a secure grid environment using a generic trust model (See appendix A). This means that every single user can demand the other users or items provided by users to fit certain requirements. In the SPINGRID system a project admin can by example approve a single resource. He can also approve all the resources provided by a single resource provider.

An approver can approve or disapprove an item that can be approved. He can also require that an item is approved by another user (e.g. the system admin).

A user can always see a list of his approved items.

2.5 Environment description

Figure 2.3 shows the environment in which the SPINGRID system shall operate. The core of the system consists of a (dedicated) dispatcher or a network of dispatchers. The user-end of the system consists of regular computer systems. The resources and the core are connected over the internet using a way of communication that is not blocked by any firewall, like HTTP or HTTPS.

2.6 Assumptions and dependencies

It is assumed that the testing environment is available during the development and testing phase of the project.
Chapter 3

Use Cases

A Use Case is a piece of functionality in the system. Those pieces will return a value to a user, where a user does not have to be a human, but could also be a computer system.

3.1 System Admin Use Cases

UC_1010
The system admin logs in

Precondition: true
Postcondition: P1010: The system admin is logged in
User: System Admin

- The system admin connects to the SPINGRID system.
- The SPINGRID system asks for authentication.
- The system admin provides his correct authentication.
- The SPINGRID system approves the authentication.

UC_1015
The system admin requests a list of all projects

Precondition: P1010
Postcondition: A list of all projects is returned by the system.
User: System Admin

- The system admin enters the command to return a list of all projects in the system.
- The system returns a list of all projects.

UC_1020
The system admin adds a project
CHAPTER 3. USE CASES

Precondition: P1010 & There are X projects
Postcondition: P1020a: There are X+1 projects & P1020b: There is at least one project
User: System Admin

- The system admin enters a unique project name and a project admin.
- The SPINGRID system confirms that the project is added.

UC_1030
The system admin removes a project

Precondition: P1010 & P1020a & P1020b
Postcondition: There are X projects
User: System Admin

- The system admin enters a valid project name.
- The SPINGRID system removes all jobs in the project and the project itself and confirms that the project is deleted.

UC_1040
The system admin configures which users are not allowed in the system.

Precondition: P1010
Postcondition: P1040: The system is configured to block a set of users
User: System Admin

- The system admin wants to be able to block some users.
- He enters a selection of users
- The SPINGRID system confirms his configuration.

UC_1050
The system admin configures which users are allowed in the system.

Precondition: P1010
Postcondition: P1050: The system is configured to only allow a set of users
User: System Admin

- The system admin wants to be able to only allow a specific set of users.
- He enters a selection of users
- The SPINGRID system confirms his configuration.

UC_1055
The system admin requests a list of all project admins of a certain project.

Precondition: P1010
Postcondition: P1055: The system has returned a list of all project admins in the project.
User: System Admin
CHAPTER 3. USE CASES

• The system admin enters a project name into the system.
• The SPINGRID system returns a list of the project admins in that project.

**UC_1060**

*The system admin assigns a project admin to a project*

Precondition: P1010 & P1020 & X is not the project admin of Y & Y is the project

Postcondition: P1060a: X is the admin of project Y & P1060b: There are at least two project admins

User: System admin

• The system admin wants to add a certain person to a certain project as a project admin.
• He enters a project and a user.
• The SPINGRID system will confirm that the user is a project admin of the project.

**UC_1070**

*The system admin removes a project admin from a project.*

Precondition: P1010 & P1020 & P1060 & P1060a & P1060b

Postcondition: X is not an admin of project Y & There is at least one project admin

User: System admin

• The system admin wants to delete a certain project admin from a certain project.
• The system admin enters a project name

**UC_1072**

*The system admin authorizes a user to become an application provider.*

Precondition: P1010 & X is a user.

Postcondition: X has the role of application provider.

User: System Admin

• The system admin enters a user to become an application provider.
• The system confirms that the role of application provider has been given to the user.

**UC_1074**

*The system admin authorizes a user to become a data provider.*

Precondition: P1010 & X is a user.

Postcondition: X has the role of data provider.

User: System Admin

• The system admin enters a user to become a data provider.
• The system confirms that the role of data provider has been given to the user.

**UC_1076**  
_The system admin removes the role of application provider from an application provider._  
Precondition: P1010 & X is an application provider.  
Postcondition: X has no longer the role of application provider.  
User: System Admin

• The system admin enters an application provider to remove the role from.  
• The system confirms that the user is no longer an application provider.

**UC_1078**  
_The system admin removes the role of data provider from a data provider._  
Precondition: P1010 & X is a data provider.  
Postcondition: X has no longer the role of data provider.  
User: System Admin

• The system admin enters a data provider to remove the role from.  
• The system confirms that the user is no longer a data provider.

**UC_1100**  
_The system admin requests a list of all jobs in the system._  
Precondition: P1010  
Postcondition: A list is returned with all jobs in the system.  
User: System Admin

• The system admin enters the command to request a list of all jobs.  
• The system returns a list of all jobs with their status and to which project they belong.

### 3.2 Resource Provider Use Cases

**UC_2010**  
_The resource provider installs the software_  
Precondition: true  
Postcondition: P2010: The computer is now a part of the SPINGRID system  
User: resource provider

• The resource provider will download the right software of the SPINGRID system and starts the installer.
• The installer software will give instructions on how to install.
• The computer owner follows the instruction and runs the recently installed software.
• The software is now running.

**UC_2014**
The resource provider offers his resource to a project which does not require authentication.

Precondition: P2010 & not(P3050) & X is the resource provider & Y is the project
Postcondition: P2014,2015: X participates in Y
User: resource provider

• The resource provider enters the project name of the project in which he wants to contribute.
• This project does not require authentication.
• The SPINGRID system confirms that the resource provider will now be able to run jobs from the mentioned project.

**UC_2015**
The resource provider offers his resource to a project which does require authorization.

Precondition: P2010 & P3050 & X is the resource provider & Y is the project
Postcondition: P2014,2015: X participates in Y
User: resource provider

• The resource provider enters the project name of the project in which he wants to contribute.
• This project requires authentication.
• UC_2020 is executed.
• The SPINGRID system confirms that the resource provider will now be able to execute jobs for the mentioned project.

**UC_2020**
The resource provider authenticates himself

Precondition: P2010 & X wants to authenticate
Postcondition: X is authenticated
User: resource provider

• A resource provider wants to authenticate himself.
• The SPINGRID system will ask for a form of authentication.
• A resource provider will authenticate himself uniquely.
• The SPINGRID system will check this authentication, and confirm that the resource provider is authenticated.

UC_2025
The resource provider accepts applications from an application provider
Precondition: P2010 & An application from application provider X can not always be executed on the resource
Postcondition: P2025: All applications from application provider X are allowed to be executed on the resource
User: resource provider

• A resource provider trusts a certain application provider.
• He enters the application provider he trusts.
• The system will confirm that the application provider is now trusted.

UC_2050
The resource provider uninstalls the software
Precondition: P2010
Postcondition: The software is not installed on the resource
User: Resource provider

• The resource provider starts the uninstallation software.
• The uninstallation software will remove the parts of the SPINGRID system from the computer.

3.3 Project Admin Use Cases

UC_3010
A project admin logs in.
Precondition: true
Postcondition: P3010: The project admin is logged in
User: Project Admin

• The project admin connects to the SPINGRID system.
• The SPINGRID system asks for an authorization.
• The project admin provides a correct authorization.
• The SPINGRID system confirms that the authorization is successfully completed.
CHAPTER 3. USE CASES

**UC_3020**
A project admin adds a job provider to his project.

Precondition: P3010 & X is the job provider
Postcondition: P3020a: There is at least one job provider & P3020b: X can now submit a job within the project.
User: Project Admin

- The project admin enter a user he wants to add as job provider and to which project he wants him added.
- The SPINGRID system confirms that the job provider is added.

**UC_3030**
A project admin removes a job provider from his project.

Precondition: P3010 & P3020a & P3020b
Postcondition: The job provider can not submit a job within the project and all jobs of that job provider are removed.
User: Project Admin

- The project admin enters which job provider he wants removed from which project.
- The SPINGRID system confirms the removal.

**UC_3040**
A project admin configures that he only wants applications/data of certain providers to be used in his project.

Precondition: P3010
Postcondition: Only applications/data of the entered providers may be used in the project.
User: Project Admin

- The project admin enters the providers that he trusts.
- The SPINGRID system confirms that only those providers are trusted.

**UC_3045**
A project admin allows all applications.

Precondition: P3010
Postcondition: All applications in the system may be used in his project.
User: Project Admin

- The project admin enters that he trusts all applications in one of his projects.
- The system confirms that all applications are allowed in his project.
CHAPTER 3. USE CASES

UC_3046
A project admin allows all data files.

Precondition: P3010
Postcondition: All data files in the system may be used in his project.
User: Project Admin

- The project admin enters that he trusts all data files in one of his projects.
- The system confirms that all data files are allowed in his project.

UC_3050
A project admin configures a project so that resources require authentication.

Precondition: P3010 & Y is this project
Postcondition: P3050: Only resource providers with a correct authentication can compute a job from Y.
User: Project Admin

- The project admin chooses to require resource authentication.
- The SPINGRID system asks for an authorization method.
- The project admin provides the authorization method.
- The SPINGRID system confirms the action.

3.4 Application Provider Use Cases

UC_4010
An application provider logs in

Precondition: true
Postcondition: P4010: The application provider is logged in
User: Application Provider

- The application provider connects to the SPINGRID system.
- The SPINGRID system asks for an authentication.
- The application provider provides his correct authentication.
- The SPINGRID system confirms that the authorization is successfully completed.

UC_4020
An application provider provides an application

Precondition: P4010 & There are X applications
Postcondition: P4020a: There are X+1 applications & P4020b: There is at least one application
User: Application Provider
• The application provider enters the location of his application.
• The SPINGRID system confirms the action.

UC_4030
An application provider deletes his application from the SPINGRID system
Precondition: P4010 & P4020b & P4020a
Postcondition: There are X applications
User: Application Provider

• The application provider requests a list of all his applications.
• The SPINGRID system returns a list of applications.
• The application provider enters the application he want to delete.
• The SPINGRID system confirms the deletion.

UC_4040
An application provider restricts access to his applications
Precondition: P4010
Postcondition: The selected applications of the application provider can only be used by jobs in the selected projects.
User: Application Provider

• The application provider enters which applications may be used in which projects.
• The SPINGRID system confirms that the selected applications can only be used in the selected projects.

3.5 Data Provider Use Cases

UC_5010
A data provider logs in
Precondition: true
Postcondition: P5010: The data provider is logged in
User: Data Provider

• The data provider connects to the SPINGRID system.
• The SPINGRID system asks for an authentication.
• The data provider provides his correct authentication.
• The SPINGRID system confirms that the authorization is successfully completed.
CHAPTER 3. USE CASES

UC_5020
The data provider provides a data file

Precondition: P5010 & There are X data files
Postcondition: P5020a: There are X+1 data files & P5020b: There is at least one application
User: Data provider

- The data provider chooses to provide a data file.
- The SPINGRID system asks the location of the data file.
- The data provider provides a correct location.
- The SPINGRID system confirms the action.

UC_5030
A data provider deletes the location of his data file

Precondition: P5010 & P5020a & P5020b
Postcondition: There are X data files in the system.
User: Data Provider

- The data provider requests a list of all his data files.
- The SPINGRID system returns a list of selectable data files.
- The data provider enters the data file he wishes to delete.
- The SPINGRID system confirms that the location to the data file has been deleted from the system.

UC_5040
A data provider restricts access to his data

Precondition: P5010
Postcondition: All data files of the data provider are secured
User: Data Provider

- The data provider chooses to classify his data.
- He enters the projects for which his data may be used.
- The SPINGRID system confirms that the data can only be used in the selected projects.

3.6 Job Provider Use Cases

UC_6010
A job provider logs in


Precondition: true
Postcondition: P6010: The job provider is logged in
User: Job Provider

- The job provider connects to the SPINGRID system.
- The SPINGRID system asks for an authentication.
- The job provider provides his correct authentication.
- The SPINGRID system confirms that the authorization is successfully completed.

**UC_6020**
*The job provider successfully submits a job*

Precondition: P6010 & X is a job
Postcondition: P6020: Job X is submitted to the SPINGRID system
User: Job provider

- The job provider enters the job he wants to submit with a corresponding job description.
- The SPINGRID system confirms that the job is valid.

**UC_6040**
*The job provider retrieves the result of a job*

Precondition: P6010 & P6020 & not(P6050b)
Postcondition: The job provider has the result corresponding to job X
User: Job provider

- The job provider enters for which job he wants the result.
- The SPINGRID system will return the job provider the result.

**UC_6050**
*The job provider removes a job which is running or in the waiting queue.*

Precondition: P6010 & P6020
Postcondition: The SPINGRID system will no longer use resources for X & P6050b: X is marked as failed
User: Job provider

- The job provider requests a list of his jobs.
- The SPINGRID returns the list of his jobs.
- The job provider enters the job he wants to remove.
- The SPINGRID system will confirm that the job is removed.
Chapter 4

User Requirements

Below are the User Requirements. Every requirement is accompanied by a priority level. This priority level is mapped on integers from 1 to 5, where 1 stands for the highest priority and 5 stands for the lowest priority. User requirements marked with priority level 1 and 2 will be implemented regardless of resources. User requirements marked with priority level 3, 4 and 5 will only be implemented in priority order if time allows.

4.1 General Requirements

UR_0010
The SPINGRID system shall implement a computational grid.
Priority: 1
This means that the system is able to execute massive processing jobs.

UR_0020
The language to be used in the SPINGRID system should be English.
Priority: 1

UR_0030
The SPINGRID system shall provide a command-line interface through which a user can interact with the system.
Priority: 1
Users can use a command-line tool to submit jobs and check on them. A command-line tool will be used so that the process can be automated if necessary. This can be done by using a shell script for example.

UR_0040
The SPINGRID system shall provide a web-based user interface through which a user can interact with the system.
CHAPTER 4. USER REQUIREMENTS

Priority: 4

A web-based interface would be more usable and requires less expertise than the command-line interface.

UR_0050
The system shall be able to process at least 40 executing jobs at a time.
Priority: 1

The SPINGRID system should be designed to be expandable. The minimum amount of jobs should be 40, but the system will be designed to be able to handle more.

UR_0060
The SPINGRID system shall select the resource that will be used for processing a job.
Priority: 1

UR_0070
The SPINGRID system shall only send jobs to resources if their characteristics match or exceed the characteristics required by the job and application(s) used in the job.
Priority: 2

UR_0080
The SPINGRID system should provide a trust model as described in section 2.4.2
Priority: 4

4.2 Job Requirements

UR_1010
The language used to describe a job should be a standardized one or one proposed for standardization.
Priority: 3

This would make it more easy for the SPINGRID system to cooperate with other systems. An example of a language that could be used is XML or JSDL [RD_2].

UR_1020
A job shall only be offered to the system using a job description.
Priority: 1

The job provider can describe all necessary information in the job description.

UR_1030
CHAPTER 4. USER REQUIREMENTS

The job description should contain all necessary information required by the SPINGRID system to handle the job.
Priority: 1

This information includes: location(s) of the data file(s), location(s) of the application(s), the location where to put the output file(s) and the minimal resource requirements.

4.3 System Admin Requirements

UR_2010
The SPINGRID system shall have one system admin.
Priority: 1

The system admin is the top-level user.

UR_2020
The SPINGRID system shall provide the means for a system admin to authorize a user to become an application provider.
Priority: 2

If a user has the role of application provider, he can perform all actions that requires him to be application provider.

UR_2030
The SPINGRID system shall provide the means for a system admin to authorize a user to become a data provider.
Priority: 3

If a user has the role of data provider, he can perform all actions that requires him to be data provider.

UR_2040
The SPINGRID system shall provide the means for a system admin to authorize a user to become a project admin of a project.
Priority: 1

If a user has the role of project admin, he can perform all actions that requires him to be project admin.

UR_2050
The SPINGRID system shall provide the means for a system admin to remove the role of application provider from a user.
Priority: 2
CHAPTER 4. USER REQUIREMENTS

If the user has no longer the role of application provider, he won’t be able to perform the actions of an application provider.

**UR.2060**

*The SPINGRID system shall provide the means for a system admin to remove the role of data provider from a user.*

Priority: 3

If the user has no longer the role of data provider, he won’t be able to perform the actions of a data provider.

**UR.2070**

*The SPINGRID system shall provide the means for a system admin to remove the role of project admin from a user if that project does not violate UR.4010.*

Priority: 2

If the user has no longer the role of project admin, he won’t be able to perform the actions of a project admin.

**UR.2080**

*The SPINGRID system shall provide the means for the system admin to add projects.*

Priority: 1

If the system admin creates a new project in the system, he should authorize a user to become a project admin of the new project.

**UR.2090**

*The SPINGRID system shall provide the means for the system admin to remove projects.*

Priority: 1

When the system admin removes a project, all jobs in that project will be removed, all project admins of that project will be removed and all job providers in that project will be removed.

**UR.2100**

*The SPINGRID system shall provide the means for a system admin to change system settings.*

Priority: 1

Possible system settings like how many times a job should be requeued and modify the security settings.

**UR.2110**

*The SPINGRID system shall provide the means for the system admin to request a list of all*
jobs in the system.
Priority: 2

In the list, the system admin can see which jobs are in the waiting queue, currently being processed, completed or failed.

**UR_2114**
*The SPINGRID system shall provide the means for the system admin to request a list of all project admins in a project.*
Priority: 2

**UR_2120**
*The SPINGRID system shall provide the means for the system admin to see which application providers are trusted in a project.*
Priority: 2

'Trusted' means that all applications provided by that application provider may be used in the project.

**UR_2130**
*The SPINGRID system shall provide the means for the system admin to see which data providers are trusted in a project.*
Priority: 3

'Trusted’ means that all data files provided by that data provider may be used in the project.

**UR_2140**
*The SPINGRID system shall provide the means for the system admin to see which resources have calculated which job.*
Priority: 3

**UR_2150**
*The SPINGRID system shall provide the means for the system admin to perform his actions on a computer with Windows XP, Mac OS X or Linux.*
Priority: 2

The software for the system admin should at least work on the mentioned operating systems, but we design it to work on all operating systems running a Java Virtual Machine.
4.4 Resource Providers Requirements

**UR_3010**
The SPINGRID system shall provide the means for a resource provider to offer a resource to contribute in the SPINGRID system.
Priority: 1

A resource means a computer.

**UR_3020**
The SPINGRID system shall provide the means for a resource provider to use a method to identify himself on the system.
Priority: 2

Some projects use classified information and require the resource providers to be authorized.

**UR_3030**
The SPINGRID system shall provide the means for a resource provider to select which projects he wants to provide his resource to.
Priority: 2

For example, a resource provider can choose to allow a project or all projects trusted by an other party.

**UR_3040**
The SPINGRID system shall provide the means for a resource provider to describe when his resource can be used by the SPINGRID system.
Priority: 5

The resource provider should be able to specify in which time intervals the SPINGRID system may use his resource.

**UR_3050**
The SPINGRID system shall provide the means for the resource provider to see on which project his resource is working.
Priority: 4

**UR_3060**
The SPINGRID system shall provide an option for the resource provider to select which application providers he trusts to provide him an application.
Priority: 2

'Trusted' means that all applications provided by the selected application providers may be executed on the resource.
CHAPTER 4. USER REQUIREMENTS

UR_3062
The SPINGRID system shall provide the means for a resource provider to select which applications he trusts.
Priority: 2

For example, a resource provider can choose to allow an application or all applications trusted by an other party.

UR_3070
The (de-)installation of the SPINGRID software needed by resource providers should not require a computer expert.
Priority: 1

UR_3072
Resource providers shall be provided with means by which they can inform the SPINGRID system of the characteristics of their resources.
Priority: 2

These characteristics include operation system type and version, available disk space, RAM, type and number of CPUs and connection speed.

UR_3074
The SPINGRID system shall provide the means for a resource provider to select which job providers he wants to provide him jobs.
Priority: 2

For example, a resource provider can choose to allow a job provider or all job providers trusted by an other party.

UR_3080
The SPINGRID system shall provide the means for the resource provider to perform his actions on a computer with Windows XP, Mac OS X or Linux.
Priority: 2

The software for the resource provider should at least work on the mentioned operating systems, but we design it to work on all operating systems running a Java Virtual Machine.

4.5 Project Admin Requirements

UR_4010
There should be at least one project admin assigned to all projects at all times.
CHAPTER 4. USER REQUIREMENTS

Priority: 1

This means there cannot be a project without a project admin.

**UR_4020**
The SPINGRID system shall provide the means for a project admin to assign users as job providers to his project.

Priority: 1

**UR_4030**
The SPINGRID system shall provide the means for a project admin to remove job providers from his project.

Priority: 1

When a job provider is removed from a project, all his jobs are automatically removed.

**UR_4040**
The SPINGRID system shall provide the means for a project admin to select which resource providers may process jobs of his project.

Priority: 2

Some projects may contain classified information in which case a project admin may only want to allow a selection of the resource providers to calculate on his project.

**UR_4042**
The SPINGRID system shall provide the means for a project admin to select which data sources he trusts.

Priority: 2

For example, a project admin can choose to allow a data source or all data sources trusted by an other party (for example a data provider).

**UR_4050**
The SPINGRID system shall provide the means for a project admin to select which applications he trusts.

Priority: 2

For example, a project admin can choose to allow an application or all applications trusted by an other party (for example an application provider).

**UR_4060**
The SPINGRID system shall provide the means for a project admin to select whether or not a job provider may provide his own applications for a job.

Priority: 2
CHAPTER 4. USER REQUIREMENTS

UR_4070
The SPINGRID system shall provide the means for a project admin to remove a job from his project.
Priority: 2

When a job is removed (whether the job is in the waiting queue or being processed), the job will be declared failed. A job that is completed or failed cannot be removed.

UR_4080
The SPINGRID system shall provide the means for a project admin to see a list of all jobs in his project.
Priority: 2

In the list, the project admin can see whether a job is in the waiting queue, currently being processed, completed or failed.

UR_4090
The SPINGRID system shall provide the means for the project admin to perform his actions on a computer with Windows XP, Mac OS X or Linux.
Priority: 2

The software for the project admin should at least work on the mentioned operating systems, but we design it to work on all operating systems running a Java Virtual Machine.

4.6 Application Provider Requirements

UR_5010
The SPINGRID system shall provide the means for an application provider to add applications to the system.
Priority: 1

UR_5012
The SPINGRID system shall provide the means for an application provider to remove applications from the system.
Priority: 2

UR_5020
The SPINGRID system shall provide the means for an application provider to provide applications for Windows XP, Linux or Mac OS X.
Priority: 1
This is needed so that the right application can be send to a potential resource depending on the operating system that resource is running.

**UR_5030**
The SPINGRID system shall provide the means for an application provider to select for which projects his applications may be used.
Priority: 2

For example, an application provider can choose to provide his applications to a project or all projects trusted by another party.

**UR_5040**
The SPINGRID system shall provide the means for an application provider to see on which projects his applications are used.
Priority: 3

**UR_5042**
The SPINGRID system shall provide the means for an application provider to see which applications he provides.
Priority: 3

**UR_5050**
The SPINGRID system shall provide the means for an application provider to see how often his applications have been used.
Priority: 3

**UR_5052**
Application providers shall be provided with means by which they can inform the SPINGRID system of the characteristics that their applications require.
Priority: 2

These characteristics include operating system type and version, available disk space, RAM, type and number of CPUs and connection speed.

**UR_5054**
The SPINGRID system shall provide the means for an application provider to select by which job providers his applications may be used.
Priority: 2

For example, an application provider can choose to provide his applications to a job provider or all job providers trusted by another party.

**UR_5060**

CHAPTER 4. USER REQUIREMENTS

The SPINGRID system shall provide the means for the application provider to perform his actions on a computer with Windows XP, Mac OS X or Linux.
Priority: 2

The software for the application provider should at least work on the mentioned operating systems, but we design it to work on all operating systems running a Java Virtual Machine.

4.7 Data Provider Requirements

UR_6010
The SPINGRID system shall provide the means for a data provider to add data files to the system.
Priority: 1

UR_6012
The SPINGRID system shall provide the means for a data provider to remove data files from the system.
Priority: 1

UR_6020
The SPINGRID system shall provide the means for a data provider to select for which projects his data may be used.
Priority: 2

A data provider may only want projects he has an arrangement with to use his data files.

UR_6030
The SPINGRID system shall provide the means for a data provider to see on which projects his data is used.
Priority: 3

UR_6032
The SPINGRID system shall provide the means for an data provider to see which data he provides.
Priority: 3

UR_6040
The SPINGRID system shall provide the means for a data provider to see on which applications his data is used.
Priority: 4

UR_6042
The SPINGRID system shall provide the means for a data provider to select by which job providers his data may be used.

Priority: 2

For example, a data provider can choose to provide his data to a job provider or all job providers trusted by an other party.

**UR_6050**
The SPINGRID system shall provide the means for the data provider to perform his actions on a computer with Windows XP, Mac OS X or Linux.
Priority: 2

The software for the data provider should at least work on the mentioned operating systems, but we design it to work on all operating systems running a Java Virtual Machine.

### 4.8 Job Provider Requirements

**UR_7010**
The SPINGRID system shall provide the means for a job provider to offer jobs to the system.
Priority: 1

**UR_7020**
The SPINGRID system shall provide the means for a job provider to request a list of all applications available to him.
Priority: 2

**UR_7040**
The SPINGRID system shall provide the means for a job provider to provide his own application(s) for his job.
Priority: 3

**UR_7050**
The SPINGRID system shall provide the means for a job provider to provide his own data file(s) for his job.
Priority: 2

**UR_7052**
The SPINGRID system shall provide the means for a job provider to provide his own resource(s) for his job.
Priority: 3

A job provider can always run his job on his own resource, even if this source is not trusted
UR_7060
The SPINGRID system shall provide the means for a job provider to retrieve the results of a completed job that he submitted.
Priority: 1

UR_7070
The SPINGRID system shall provide the means for a job provider to remove his jobs.
Priority: 2

When a job is removed (whether the job is in the waiting queue or being processed), the job will be declared failed. A job that is completed or failed cannot be removed.

UR_7080
The SPINGRID system shall provide the means for a job provider to see a list of his jobs.
Priority: 2

In this list the job provider can see whether his jobs are currently in the waiting queue, being processed, completed or failed.

UR_7082
Job providers shall be provided with means by which they can inform the SPINGRID system of the characteristics that their jobs require.
Priority: 2

These characteristics include operation system type and version, available disk space, RAM, type and number of CPUs and connection speed.

UR_7090
When a job is completed in the SPINGRID system, a notification should be sent to the job provider that submitted the job.
Priority: 2

UR_7100
When a job failed in the SPINGRID system, a notification with the reason of failure should be sent to the job provider that submitted the job.
Priority: 2

UR_7110
When a job is removed in the SPINGRID system, a notification of that should be sent to the job provider that submitted the job.
Priority: 3
CHAPTER 4. USER REQUIREMENTS

UR_7120

The SPINGRID system shall provide the means for the job provider to perform his actions on a computer with Windows XP, Mac OS X or Linux.

Priority: 2

The software for the job provider should at least work on the mentioned operating systems, but we design it to work on all operating systems running a Java Virtual Machine.

4.9 Extrafunctional Requirements

UR_8010

When there are at least 2 dispatchers in the SPINGRID system and one of the dispatchers disappears, the system continues like nothing has happened.

Priority: 5

This would make the system flexible when for example a network connection goes down.

UR_8020

When all the dispatchers in the SPINGRID system are down and one of them is restarted the system should continue like nothing happened.

Priority: 4

UR_8030

If one of the resource disappears while it was performing a job, the SPINGRID system should requeue the job.

Priority: 1

The system cannot determine why the resource disappeared. It can be that a network connection went down, but there is also the possibility that the resource crashed due to a faulty application. Because the reason is not known, the job is requeued.

UR_8040

A job will be declared failed after it has been requeued for a configurable number of times.

Priority: 4

When a job has been requeued a lot, the chance that an application provided by an application provider is faulty increases and so it would not be wise to requeue the job again. The number of times a job will be requeued can be set by the system admin.

UR_8050

The functionality of the system should not be restricted when computers of users are behind
a firewall (which does not restrict traffic over port 80) and/or NAT.
Priority: 2

It is important that all authorized users can access the SPINGRID system using the application software even if they're behind a firewall and/or NAT.

**UR_8060**

The SPINGRID software shall be implemented in Java according to (a tailored version of) the BSSC Java Coding Standards [RD_3].
Priority: 2

It would be easier to add or modify functionality when a standard is used.

**UR_8070**

The SPINGRID system shall be able to run for at least a week on the test environment without interruption.
Priority: 2

One does not want to have to restart the application(s) every week or day

**UR_8080**

All applications in the SPINGRID system should log what they are doing.
Priority: 2

**UR_8090**

The total time in which no dispatcher responses should not exceed one hour a day during the acceptance test on the test environment.
Priority: 2
# Appendix A

## Trust model

![Table of approval and disapproval actions for different roles and objects]

**Approved thing**

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<th>Resource Provider</th>
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<th>Data Provider</th>
<th>System Administrator</th>
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