SeaClouds Project

D5.2.2 – Final design of the User Interface

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Author(s):	Francesco D'Andria, Román Sosa González (Atos), Adrián Nieto, Miguel Barrientos, José Carrasco (UMA)
Reviewer(s)	Javier Cubo (UMA), Christian Tismer (Nuro), Miguel Barriuso (Nuro)

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Executive Summary

This deliverable exposes a high-fidelity prototype of the final design of the SeaClouds User Interface, following the design principles outlined in D5.2.1, and refined in this document.

In order to test this prototype, a plan for a usability test is presented. To gather the results, several workshops will be organized, involving student and professional profiles. In these workshops, the developer must perform some tasks using the SeaClouds platform, and fill a questionnaire.

1 Introduction

In the context of the SeaClouds project, the SeaClouds User Interface constitutes the uppermost layer in the SeaClouds architecture. The high-level specification of this interface was defined in D2.4 [1], according to the requirements elicitation defined in D2.1 [2].

This deliverable presents a UI design discussed and tested among the partners of the consortium. For details about implementation technology, or the interactions of the Dashboard with the other components of the SeaClouds platform (including sequence diagrams and data flow), refer to Deliverable D4.5 [3].

The final design presented is based on the work documented in D5.2.1 [4] about the user interaction model. Deliverable D5.2.1 adopted a dashboard metaphor for the interface inspired by the Direct Manipulation principle and WIMP (Window, Icon, Menu, Pointing device) interfaces.

Section 2 of the deliverable contains the implemented high-fidelity prototype and a summary of the design principles that have driven this prototype.

Section 3 presents a plan for a Usability Testing of the User Interface, involving both university students and professional developers.

Annex 1 contains the questionnaire to be filled by the participants in the Usability Testing workshops.

1.1 Glossary of Acronyms

Acronym	Definition
(GUI)	(Graphical) User Interface
QoS	Quality of Service
QoB	Quality of Business
WIMP	Window, Icon, Menu, Pointing

Table 1: Glossary of acronyms

2 User Interface Design

We defined in D5.2.1 the design metaphor that our interface needed to implement, namely a dashboard. The choice was motivated by the fact that web dashboards are designed to layout large amounts of information into a single page so end-users can easily find, retrieve, understand and process all that information at a glance.

One important question that remained without decision in D5.2.1 was the use of an existing TOSCA solution like Winery [5] for modelling the application topologies, or implementing our own Topology Designer from scratch. The latter option was taken (see Figure 1, where a view of the designer for the application status is depicted), decision motivated by the SeaClouds objective to have a high-level and easy to use topology designer, while Winery was not fulfilling that requirement at the moment.

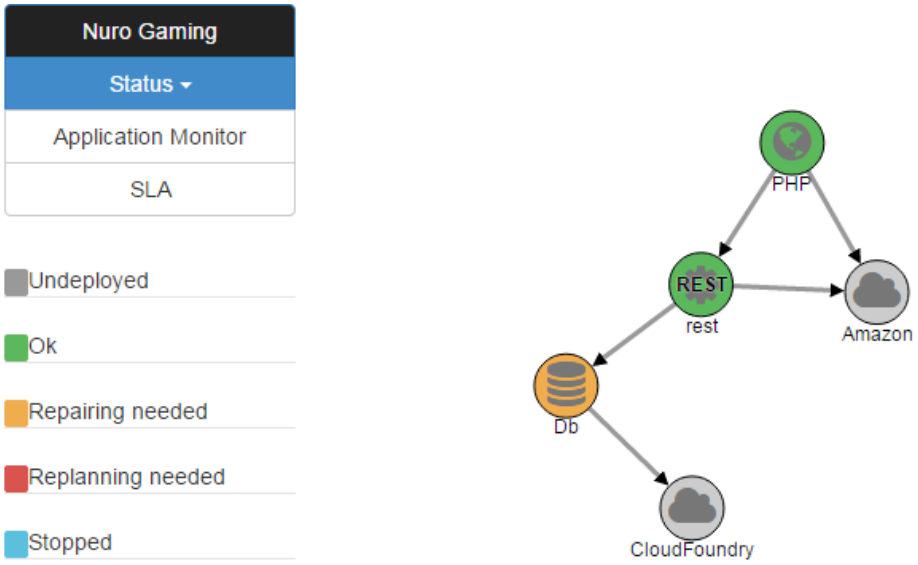

Figure 1: Example of a view of the designer for the application status in SeaClouds

2.1 Design principles

In D5.2.1, we presented common principles in the design of dashboards, some of them referenced in the literature [6]. These principles are:

- Avoid scrolling information. Keep useful data visible at once.
- Give context to data, required to understand information in its correct context.
- Avoid too detailed information. Provide just high level information to give quick overview.
- Choose the right measure and display to render the data (for instance, render long structure data in a chart bar, pie, etc., rather than in table).
- Avoid meaningless colour coding.

- Highlight important data.

Besides these principles, the design of the SeaClouds UI was focused around three fundamental ideas:

- The UI prioritizes functionality over look & feel.
- The Application Topology is the central and most important view of the UI.
- Use of wizards to facilitate the use of some operations.

2.2 High-fidelity prototype

In this phase of the project, we have implemented a high-fidelity prototype. A high-fidelity prototype uses the software packages to construct the user interface prototype and have a look and feel closer to the final implementation. The prototype is presented in this section.

2.2.1 Projects view

Once the user has logged into SeaClouds Platform, the dashboard shows the existing applications owned by the user, and an option to add a new application. This view is shown in Figure 2.

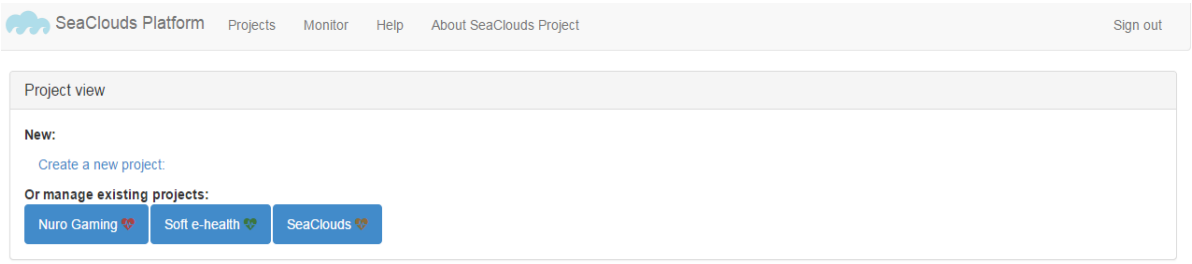

Figure 2: SeaClouds Projects View

2.2.2 Add new application wizard

This wizard allows the user to deploy a new application in one or several cloud providers. The intention of SeaClouds is that the application developer has to concentrate on the application itself, and not on cloud aspects or TOSCA terminology. As such, the developer models the application by means of describing the modules, their properties and requirements, and the relationships between them.

Then SeaClouds will suggest the ideal Cloud Providers and will provide a one-click solution to deploy the application.

The “Add application wizard” starts asking to the user the application name and some properties used to optimize the distribution of the application modules into cloud offerings. This view is shown in Figure 3.

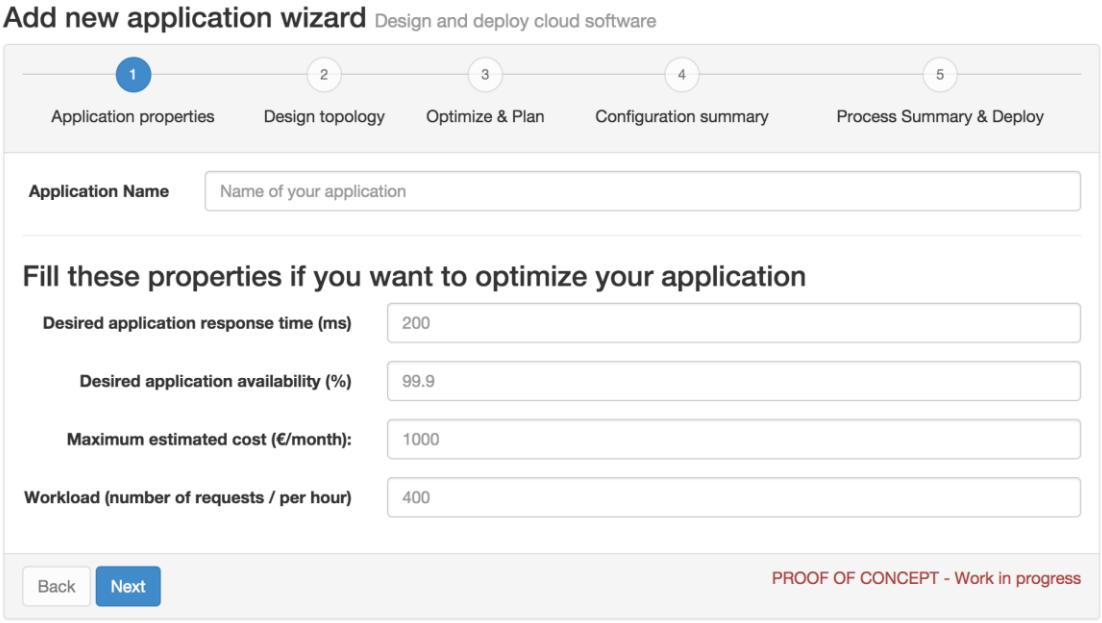

Figure 3: Add application wizard, step 1

Once the step 1 is completed, the user proceeds to graphically design the topology of the application (see Figure 4, step 2), where the user can add each of the modules that compose the application.

The objective of this Topology Designer is to be quite easy to use and understand. The user must depict a graph of the application, where:

- Each module is represented by a graph node. To add a node, the user must select the appropriate kind of module in the palette.
- A relationship between two modules A and B is represented by an arc from A to B, meaning “A depends on B”. To create a relationship, the user must select the “Link” tool and drag from node A to node B.

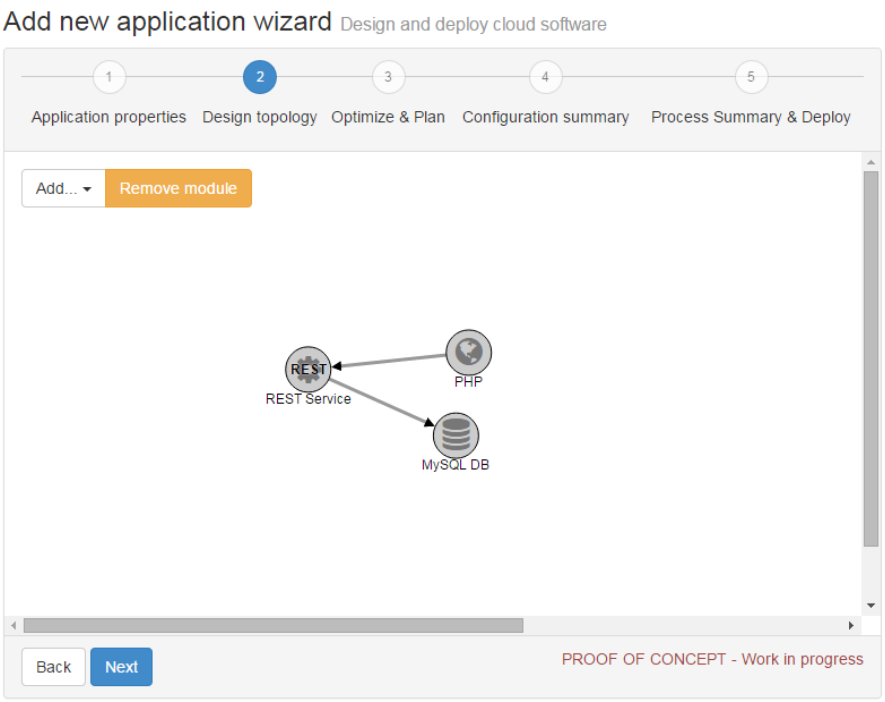

Figure 4: Add application wizard, step 2

The modules are configured through an individual interface (see

Figure 5).

This configuration includes technological requirements (programming language, version…) and non-functional requirements, including information about the cost, location, reconfiguration policies and QoS constraints.

Once all this information is filled in, the user can keep adding more modules in the same way. When all application modules are configured, the Step 2 concludes.

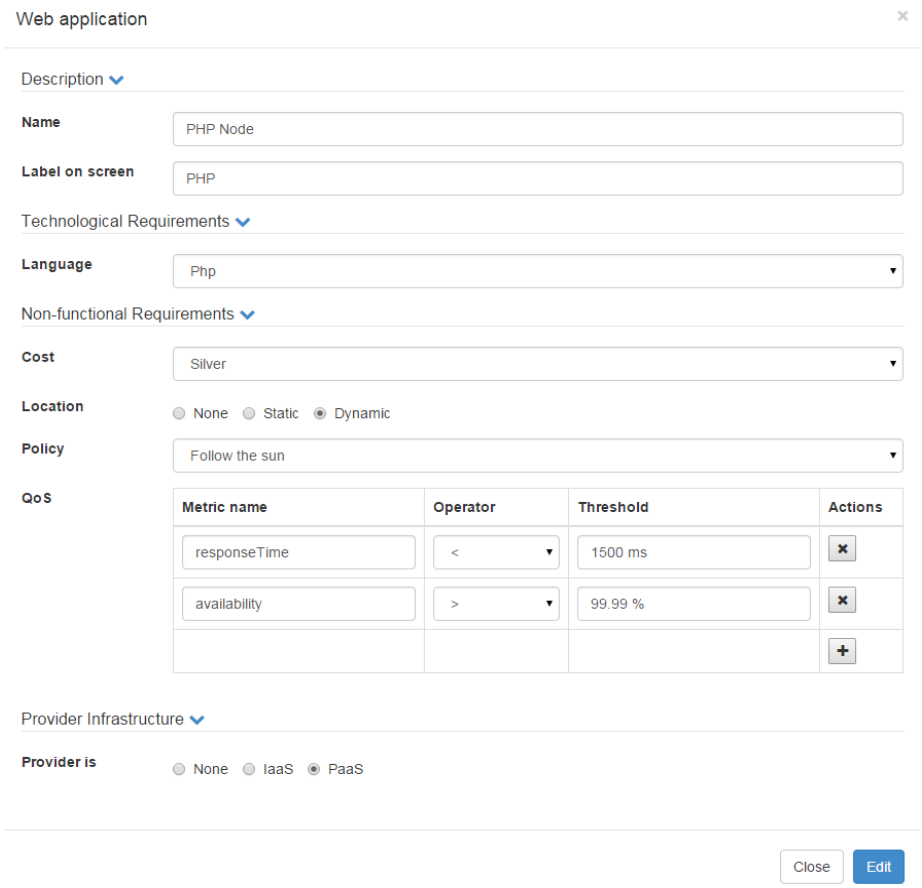

Figure 5: Configuring an application module

The next step shows the distribution of modules into cloud providers, which is the outcome of the planner and optimizer (Figure 6, step 3).

A default distribution, considered optimal, is shown to the user. The user may select this or show up to four more suitable distributions, selecting one of all these.

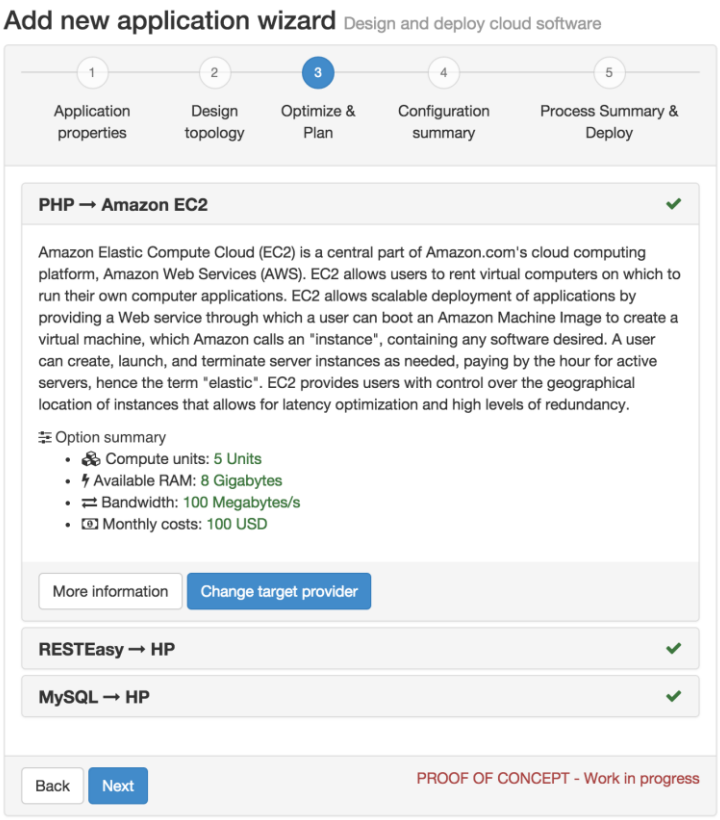

Figure 6: Add application wizard, step 3

The step 4 (Figure 7) is the last step of configuration, where the user can review the deployment just before the process starts: the selected providers, cloud resources, estimated costs and other key properties of the application. In this step, the user must enter the cloud provider credentials, the artefacts of each module, and any other information needed to generate the deployment descriptor. The user has also the possibility to manually modify the WS-Agreement SLA, which was automatically generated from the high-level input introduced in the previous steps.

The “Deploy” button starts the deployment of the application, and takes us to the “Status” view.

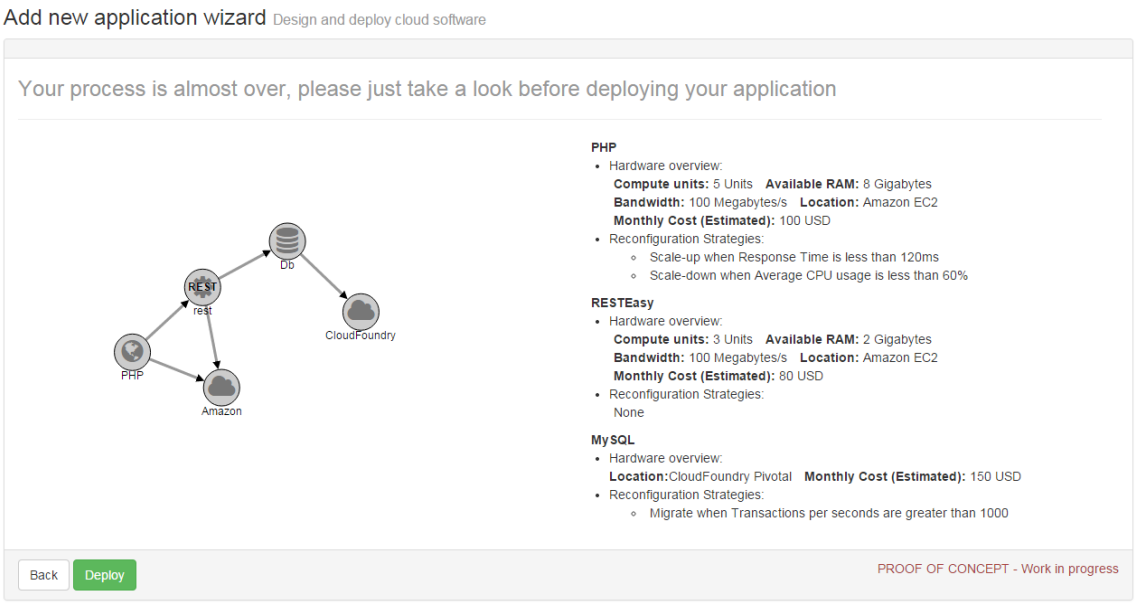

Figure 7: Add application wizard, step 4

2.2.3 Remove application wizard

The remove application assistant is a very simple wizard. The first step of the wizard (Figure 8) shows the information about the application that the user wants to remove and asks for confirmation.

During the last step, the deletion process occurs and a log is shown with the result of the process (Figure 9).

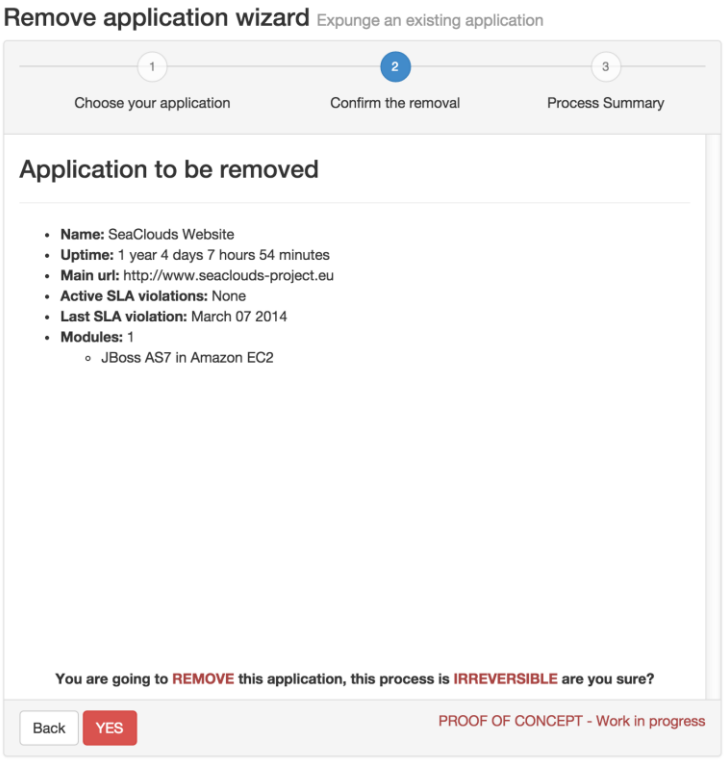

Figure 8: Remove application, confirmation

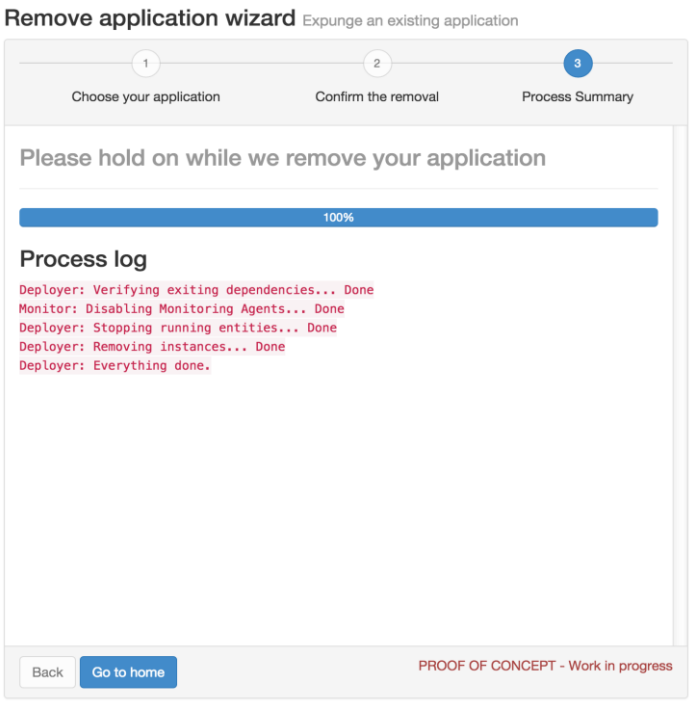

Figure 9: Remove application, log

2.2.4 Status view

This is the view (Figure 10) where the application administrator can check at a glance the status of the deployed application, giving an idea of the status of the application through the colours that each node has. The start, stop and remove operations are triggered from this view.

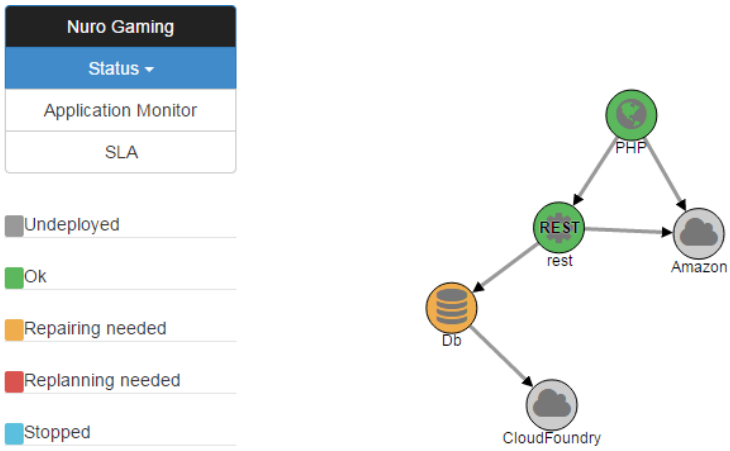

Figure 10: Status view

2.2.5 Monitor view

Once an application is deployed and running, the administrator is able to check the performance using the Monitor interface. Figure 11 shows an example where several metrics of an application are being monitored.

2.2.6 SLA view

The SLA view (Figure 12) details the current SLA accomplishment, allowing the administrator to check if the application has been fulfilling the QoS and QoB requirements specified at design time. It maintains a list of the occurred QoS violations and the list of penalties as consequence of the aforementioned violations.

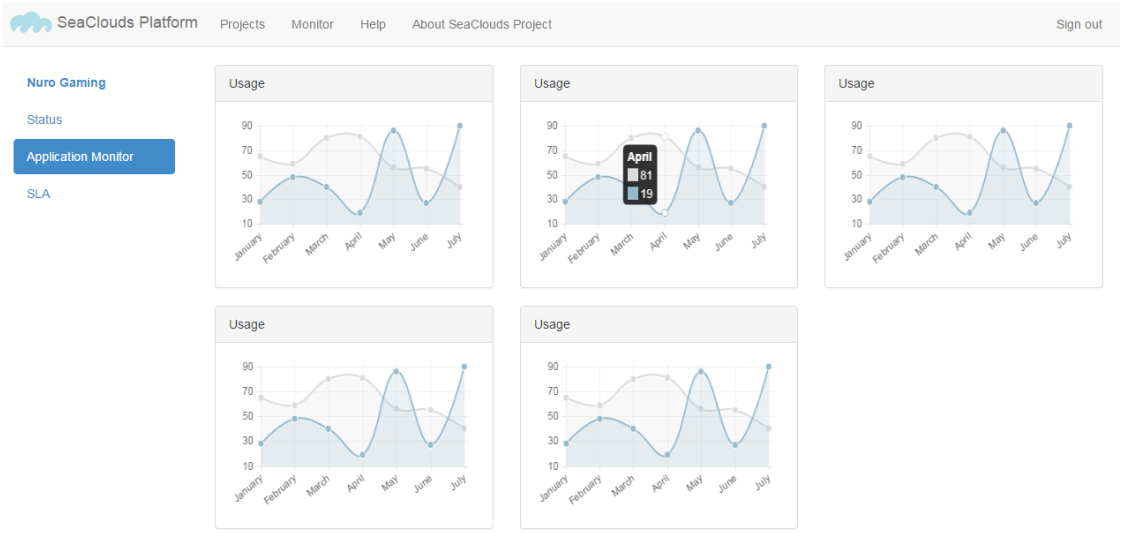

Figure 11: Monitor view

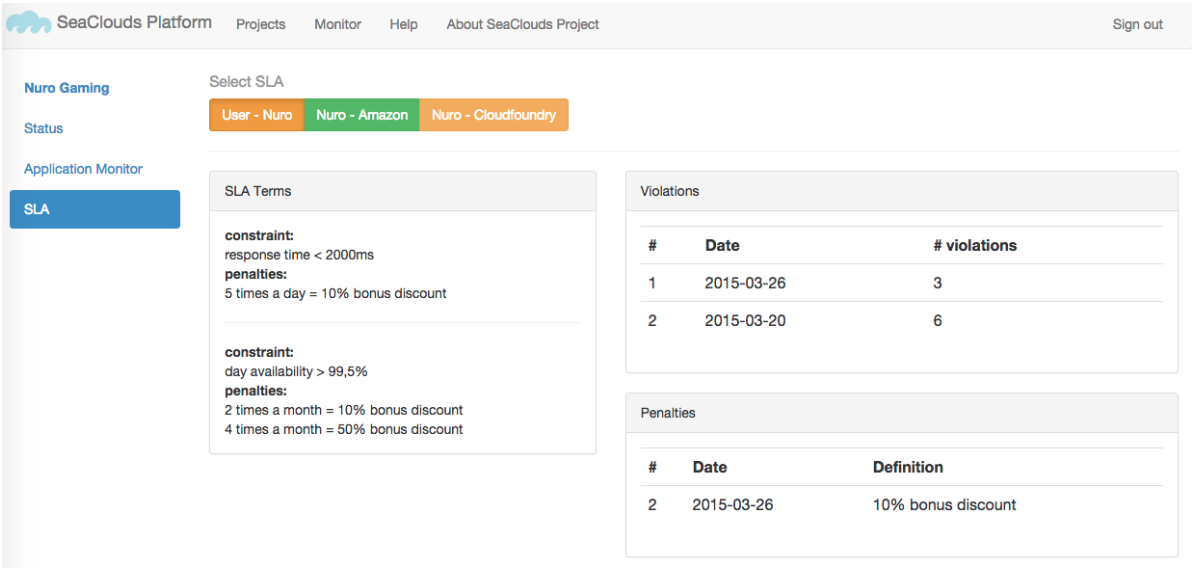

Figure 12: SLA view

3 Usability testing

In this section we describe our plan to test the usability of the SeaClouds GUI.

The preliminary result of the Usability testing will be included in the D6.4.2 “SeaClouds periodic evaluation reports”, which will be delivered on M24. While the final outcomes of the usability evaluation will be included in the deliverable D6.4.3 “SeaClouds periodic evaluation reports”, delivered on M28.

The proposed plan is to organize workshops where a small set of developers learn about SeaClouds, trying to execute some exercises using the platform. After the exercises, they have to fill a questionnaire with their experience about the usability of SeaClouds.

The questionnaire is composed of 3 sections: i) General questions about the person's experience, to help to categorize the data, ii) Questions about the difficulty to finish each of the tasks, and iii) Summary questions about the experience using the platform: Was it easy? Was it fast? Was it friendly?

There will be two rounds of workshops, each one with different profiles of developer.

A preliminary version of the questionnaire is provided in Annex 1. A final version will be prepared before the workshops take place, and will be delivered in the final evaluation documents D6.4.2 and D6.4.3.

3.1 Plan and testing scenarios

The plan includes two scenarios, covering the most of the operations that SeaClouds provides. Any testing user has to complete the tasks of the scenarios in order to have knowledge of the platform usage.

The two scenarios are:

- Design and deploy an application using the application wizard. The application to deploy is a 3-tier web application, with three modules: a PHP web application, a REST web services component programmed in Java, and a MySQL database. The tasks to perform in each step of the wizard are:
    - Fill application properties: the user must give a name to the application and fill some needed properties if the application wants to be optimized.
    - Design application topology: the user must model, in a graphical way, the modules that are compounding the application, and the relationships between them. The use must also enter the required constraints about Quality of Service.
    - Plan: the user must select one of the options that the planner has calculated as appropriate.
    - Configuration: the user must enter the credentials of the cloud providers, and the GitHub URLs where the sources of the application are hosted.

  - Deploy: the user must run the deployment and check that the application is up and running.

- Manage a deployed application. From the SeaClouds home, the user must select the previously deployed application and perform the following tasks:
  - Check the application status: visualize in a graphical way the status of application, checking if the application is running according to the desired QoS.
  - Manage lifecycle: the user must stop the application and check the application is down. After this, the user must restart the application.
  - Monitor application: the user must access the Monitor Application view and monitor the response time and availability of the modules of the application.
  - Check SLA agreements: the user must access the SLA view and check if any guarantee term has been violated, and consult the raised violations and penalties.
  - Remove application: in this last step, the user must remove the application.

These scenarios have to be probably cheated in some way to deploy the application in "controlled" providers. Remember that not all providers offer free or trial accounts. The decision of the "controlled" providers has to be postponed to a time closer to the actual tests, because providers may change their offerings meanwhile.

3.2 University Beta Testing Program

The first round of the testing will be carried out by college students. The SeaClouds consortium already has the commitment of the three universities involved in the project, University of Málaga, Politecnico di Milano and University of Pisa, and they will organize a workshop in their dependencies.

The desired number of filled questionnaires is about 30, so it will suffice if each workshop holds 10 students.

3.3 Professionals Beta Testing Program

The second round of the testing will be carried out by professionals in the scope of cloud computing. A workshop, still to determine, will be organized. The contents of the workshop are the same as for the University Beta Testing Program.

The desired number of filled questionnaires is about 15.

4 Conclusions

In this deliverable we presented the final design of the SeaClouds User Interface, underlying the principles that have driven the design. These principles have been initially defined in D5.2.1 and refined in the present document. In Deliverable D4.5, can be found more details about implementation technology, or the interactions of the Dashboard with the other components of the SeaClouds platform

Since the release of D5.2.1, the consortium finally decided to implement a Topology Designer from scratch in order ensure the usability of that component.

When the platform will be distributed to real users, we will collect their feedback and examine whether the User Interaction we implemented needs to be revised. This is necessary since until now we could only test parts of the platform, and because the latter was still under development.

In order to collect the feedback from the users, a plan for a Usability Testing has been designed. The results of this testing will be delivered in deliverables D6.4.2 and D6.4.3.

Annex A. SeaClouds – User Interface evaluation questionnaire

SEAClouds - Usability Evaluation

The questionnaire consists of two parts: General Questions and Questions on system usability to sustain or refute the previously stated hypotheses.
The first part includes questions about age, gender and experience, which will help us to categorize the questionnaires results. The second part contains tasks and questions, which you can solve and answer while getting familiar with the system.

The SeaClouds website is available at the following URL:
http://www.seaclouds-project.eu

*Required

General questions

1. **Your Name**
   This is an optional field. The SeaClouds partners are kindly ask to identify themselves.

2. **Your Company**
   This is an optional field. The SeaClouds partners are kindly ask to identify themselves.

3. **Specify your age** *

4. **Select your gender below** *
   Mark only one oval.
   - Male
   - Female
   - Don't want to disclose

5. **Describe your occupation** *

.

6. **Describe your level of acquaintance with Web-development** *
Mark only one oval.

- ◯ Beginner
- ◯ Intermediate
- ◯ Advanced
- ◯ Professional

7. **How many years are you doing Web-development?**

_____

8. **Describe your level of acquaintance with Cloud-computing**
Mark only one oval.

- ◯ Never heard about it before
- ◯ Heard about it a couple of times
- ◯ I follow this topic
- ◯ Planning to test/use
- ◯ Testing
- ◯ Use it/Deployed in some production systems
- ◯ Use it intensively in many projects

9. **Which IaaS/PaaS providers have you been using before?**
i.e. AWS, HPCloud, Heroku, OpenShift, CloudFoundry, etc

_____

_____

_____

_____

_____

Tasks & questions on system usability and performance

Scenario 1: Design and deploy an application

In this simplest scenario, user will design a basic application topology according to provided requirements and will perform the deployment of the application into the suggested cloud offerings by the planner.

10. **Create new project and enter application properties** *

Using SeaClouds web-interface, start the new project wizard and enter the application properties: name and needed properties for the optimizer.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?	◯	◯	◯	◯	◯
Was the result/output easy to understand?	◯	◯	◯	◯	◯

11. What kind of difficulties you encountered (if any)?

12. **Design the application topology** *

Use the topology designer to create a web application composed of three modules: a Django frontend, a RESTful web services developed in Java, and a mysql 5.5 database.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?	◯	◯	◯	◯	◯
Was the result/output easy to understand?	◯	◯	◯	◯	◯

13. What kind of difficulties you encountered (if any)?

14. **Start a planning and select the desired plan** *
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?	◯	◯	◯	◯	◯
Was the result/output easy to understand?	◯	◯	◯	◯	◯

15. What kind of difficulties you encountered (if any)?

16. **Enter needed properties in the configuration summary step** *
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?	◯	◯	◯	◯	◯
Was the result/output easy to understand?	◯	◯	◯	◯	◯

17. What kind of difficulties you encountered (if any)?

18. **Perform the deployment of the application** *
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?	◯	◯	◯	◯	◯
Was the result/output easy to understand?	◯	◯	◯	◯	◯

19. What kind of difficulties you encountered (if any)?

20. **Ensure your application is up and running** *
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?					
Was the result/output easy to understand?					

21. What kind of difficulties you encountered (if any)?

Tasks & questions on system usability and performance

Scenario 2: The user manages a deployed application

In this scenario the user has created and deployed an application, and wants to explore the features offered by SeaClouds to manage, monitor and check the QoS fulfillment.

22. **Browse to management of deployed application** *
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?					
Was the result/output easy to understand?					

23. What kind of difficulties you encountered (if any)?

24. **Application life-cycle management** *
Stop the previously deployed application. Ensure the application is not serving requests at the corresponding URL. Start the application again. Ensure the application is serving requests again.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?					
Was the result/output easy to understand?					

25. What kind of difficulties you encountered (if any)?

26. **Application life-cycle management** *
Stop the previously deployed application. Ensure the application is not serving requests at the corresponding URL. Start the application again. Ensure the application is serving requests again.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?					
Was the result/output easy to understand?					

27. What kind of difficulties you encountered (if any)?

28. **Application monitoring using SeaClouds web-interface** *

Perform some basic monitoring of your application execution (figure out which metrics are available and how to interpret them) using SeaClouds web-interface.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with someone's help	Yes, with someone's help	No
Was it easy to solve the task?					
Was the result/output easy to understand?					

29. What kind of difficulties you encountered (if any)?

30. **Checking SLA contracts and violations** *

For the deployed application check the SLA contract (if specified) and check if it is violated. If you didn't specify SLA contact during deployment, please, re-deploy your app with SLA specification.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?					
Was the result/output easy to understand?					

31. What kind of difficulties you encountered (if any)?

32. **Comparing applications running on different clouds** *
Deploy 2 applications on 2 different PaaS providers. Compare the monitoring metrics between them.
Mark only one oval per row.

	Yes, without problems	Yes, with minor problems	Yes, with some complications	Yes, with someone's help	No
Was it easy to solve the task?	◯	◯	◯	◯	◯
Was the result/output easy to understand?	◯	◯	◯	◯	◯

33. What kind of difficulties you encountered (if any)?

34. **Configuration of SeaClouds deployment is not a substantial overhead over the direct deployment**
Mark only one oval.

	1	2	3	4	5	
Strongly agree	◯	◯	◯	◯	◯	Strongly disagree

35. **SeaClouds offers the same management experience for different providers**
Mark only one oval.

	1	2	3	4	5	
Strongly agree	◯	◯	◯	◯	◯	Strongly disagree

Overall user experience rating for Web-interface

Please, provide your rating for your experience when interacting with SeaClouds system using web-interface.

36. **Not understandable vs. Understandable** *
Mark only one oval.

	1	2	3	4	5	6	7	
not understandable	◯	◯	◯	◯	◯	◯	◯	understandable

37. **Easy to Learn vs. Difficult to Learn** *
Mark only one oval.

	1	2	3	4	5	6	7	
easy to learn	◯	◯	◯	◯	◯	◯	◯	difficult to learn

38. **Not Interesting vs. Interesting** *
Mark only one oval.

	1	2	3	4	5	6	7	
not interesting	◯	◯	◯	◯	◯	◯	◯	interesting

39. **Unpredictable vs. Predictable** *
Mark only one oval.

	1	2	3	4	5	6	7	
unpredictable	◯	◯	◯	◯	◯	◯	◯	predictable

40. **Fast vs. Slow** *
Mark only one oval.

	1	2	3	4	5	6	7	
fast	◯	◯	◯	◯	◯	◯	◯	slow

41. **Obstructive vs. Supportive** *
Mark only one oval.

	1	2	3	4	5	6	7	
obstructive	◯	◯	◯	◯	◯	◯	◯	supportive

42. **Good vs. Bad** *
Mark only one oval.

	1	2	3	4	5	6	7	
good	◯	◯	◯	◯	◯	◯	◯	bad

43. **Complicated vs. Easy** *
Mark only one oval.

	1	2	3	4	5	6	7	
complicated	◯	◯	◯	◯	◯	◯	◯	easy

44. **Usual vs. Leading Edge** *
Mark only one oval.

	1	2	3	4	5	6	7	
usual	◯	◯	◯	◯	◯	◯	◯	leading edge

45. **Secure vs. Not Secure** *
Mark only one oval.

	1	2	3	4	5	6	7	
secure	◯	◯	◯	◯	◯	◯	◯	not secure

46. **Meets Expectations vs. Does Not Meet** *
Mark only one oval.

	1	2	3	4	5	6	7	
meets expectations	◯	◯	◯	◯	◯	◯	◯	does not meet

47. **Clear vs. Confusing** *
Mark only one oval.

	1	2	3	4	5	6	7	
clear	◯	◯	◯	◯	◯	◯	◯	confusing

48. **Impractical vs. Practical** *
Mark only one oval.

	1	2	3	4	5	6	7	
impractical	◯	◯	◯	◯	◯	◯	◯	practical

49. **Organized vs. Cluttered** *
Mark only one oval.

	1	2	3	4	5	6	7	
organized	◯	◯	◯	◯	◯	◯	◯	cluttered

50. **Friendly vs. Unfriendly** *
Mark only one oval.

	1	2	3	4	5	6	7	
friendly	◯	◯	◯	◯	◯	◯	◯	unfriendly

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