ANNOUNCEMENT OF A COMPETITIVE CALL TO SELECT EXPERIMENTS and a CLOUD INFRASTRUCTURE PROVIDER FOR THE BonFIRE PROJECT

The following project currently active in the Seventh Framework Programme of the European Community for research and technological development contributing to the creation of the European research area and to innovation (2007-2013) requires the participation of new project partners to carry out certain tasks within the project.

Project contract number: 257386
Project acronym: BonFIRE
Project full name: Building service test beds on FIRE
Instrument type: Integrated project
Thematic priority: Future Internet experimental facility and experimentally-driven research [ICT-2009.1.6]
Project Coordinator: Atos Spain

By means of this open call, the BonFIRE project seeks;

- TO INCORPORATE A SET OF EXPERIMENTS TO RUN TESTS ON ITS MULTI-SITE CLOUD FACILITY
- TO INCORPORATE A CLOUD PROVIDER TO PARTICIPATE AS ADDITIONAL CLOUD SITE IN THE ‘BonFIRE MULTI-CLOUD’ (Proof of Concept)

Background information

The BonFIRE (Building service testbeds for Future Internet Research and Experimentation) project is designing, building and operating a multi-site cloud-based FIRE facility to support research across applications, services and systems targeting in particular but not exclusively the research community on Internet of Services.

The BonFIRE vision is to give researchers in these areas access to a distributed cloud facility which supports experimentation of their systems and applications and the evaluation of cross-cutting aspects. We expect that this will enable innovative scenarios from the services-based distributed computing research community to be tested.

The call is structured in 2 topics as follows;

[Topic a)] BonFIRE has defined three different scenarios relevant for experiments targeting this open call where testing can be performed under different conditions:

1 Extended cloud scenario: It consists of using four BonFIRE computing sites interconnected through today’s public internet.

2 Cloud with a controlled experimental network scenario. This scenario consists of using nodes connected over a user-controlled emulated virtual internet. This second scenario is supported by the Virtual Wall environment enriched with Cloud capabilities.
The project will support the researchers to set up and run their experiments on BonFIRE. We will also provide appropriate methods for describing, deploying, managing, executing and measuring experiments in our distributed cloud infrastructure.

Expected duration of participation in project: from September 2012 to August 2013 (12 months).

[Topic b)] The project also seeks a Cloud provider to become a BonFIRE federated site and to enable the deployment of experiments.

The profile of the company we are looking to engage with is a private/public cloud infrastructure provider with access to their own platform and the ability to support the creation of a new BonFIRE site on its infrastructure.

The successful candidate will give access to their platform via programmable OCCI-based APIs and web-based interfaces and have enough capacity to host a lab-like project environment. The requested capacity to be dedicated to BonFIRE is in the region of 8 to 16 nodes x 4 cores (3GHz) 8 GB RAM and 2-3 Tb SAN.

The new provider should expose access to their resources by means of the Open Cloud Computing Interface (OCCI) to be accessed from the BonFIRE broker and become an additional BonFIRE site.

On the other hand, as another type of test, it will also have to install the BonFIRE stack (broker and portal). The provider should be able to analyze and report back on issues raised and deployment errors that might be encountered within the work of the project.

More concretely, the tasks are as follows;

- Provide access to their platform via programmable API (OCCI-based) and other web interfaces.
- Provision a dedicated lab-like project environment where experiments can be deployed.
- Provision normal operational support for this environment.
- Install and run the BonFIRE broker and portal in its environment in order to validate of the project developments (Proof of Concept).
- Support the technical and business activities in the project, by:
  - Contribution to general project requirements from its commercial point of view.
  - Contribution to identification of the business potential of the project’s experimental testing services in the cloud also including the analysis of its own business.

Expected duration of participation in project: from September 2012 to November 2013.

Facility baseline and experiments:

From an experimenter viewpoint, an experiment is composed of several services or an application or a software subsystem under iterative tests that are deployed on the cloud in certain controlled conditions. From a more provider viewpoint, we consider an experiment as a collection of Virtual Machines (VM) that contain the services and applications to be tested. It is possible to deploy and instantiate several copies of VMs and coordinate them throughout the BonFIRE facility.

We offer the experimenter the possibility to run VMs by exposing coordinated OCCI access to the different cloud sites. The experiment is planned together with the BonFIRE support team.
As a baseline, the sites are using either Xen or KVM as hypervisors. The VM Infrastructure manager is Open Nebula (3 sites), Emulab (1 site) and HP Cells (1 site) all exposing an OCCI interface, as extended by BonFIRE to meet the needs of the experimenters.

For this open call for experiments, the facility shall offer the capacity available in the site to the experiments (see table in Annex I for capacity description).

Considering a distribution of 1 VM/core, the larger experiment shall be composed by 150 VMs approximately at the same time in scenario 1. For instance, we foresee a standard experiment in scenario 1 requesting at least 40-50 VMs running at a given time across several sites.

Bigger experiments are foreseen once the on-request capacity is open.

Other experiments with special focus on network topologies and cloud are foreseen in scenario 2 and are also welcome in this second open call.

In this call, certain emphasis is given to scenario 3, in which an experimenter is requesting to deploy several VMs running across 2 cloud sites and is also specifying network parameters (mainly the reservation of bandwidth).

**Objectives of the present Call**

We are mainly looking for Testing Experiments that want to trial on the Cloud software prototypes or semi-mature results of services R&D IoS projects. Examples could be (but not restricted to) SMEs with beta technology, research partners with results of IoS previous calls project, academics with innovative technology in computer science, etc.

The experiments can chose if they target *scenario 1, 2 and/or 3* as explained in the “background” section. There is *“an increase in realism”* in the testing when approaching these scenarios. Therefore it is encouraged that the experiments target more than one scenario in their “research by experimentation” plan with the necessary justifications.

The experiments should exploit the unique features of BonFIRE facility such as the following (the proposal should highlight one or more of the following characteristics):

- Controlled deployment on the multi-site clouds (scenario 1)
- Monitoring of standard metrics at VM or physical level
- Monitoring of user specified metrics (application level) at VM level
- Controlled/advanced emulated network (emulab) (for scenario 2)
- Controlled deployment with network bandwidth guarantee between 2 cloud sites (scenario 3)
- Access to heterogeneous resources (see Annex I for the available resources), where the heterogeneity of the cloud resources and technologies must play an important role in the objective of the experiment (scenario 1 & 3).
- Typically the experiment would need to be distributed, with VMs deployed across at least 2 sites/admin domains (combination of scenarios 1 & 2 & 3)

Experiments shall propose innovative usage scenarios exploiting the multiple dimensions and scale of the facility. These activities should exhibit a degree of innovation in the use of the facility, including system level experiments, making a comprehensive use of several components of the facility, potential impact on users, etc.
Who can participate?

**Topic a) Experiments**

The profile of organizations is both academics and companies active in the ‘service research’ domain that need to run experiments to further test, consolidate or optimize their service platform, software services or tools, etc that can be encapsulated in a set of VMs.

The rules of participation are the same as for any FP7 project.

We foresee to have **typically one, maximum two participant** organizations per experiment.

The activities to be carried out in the experiment related to this call are the following:

- Design an experiment and explain the motivation
- Plan and deploy the concrete tests about the overall experiment
- Define the metrics and check monitoring data
- Support the rest of technical activities in the project, by providing feedback about the use of the facility and asking for key strategic functionalities that would be interesting to include in the facility in future versions
- Prepare a show case about the experiment that can be use for dissemination purposes
- Report the necessary effort and costs according to FP7 rules and management practices requested by the Coordinator.

A general Gantt diagram for experiment is presented in Annex II. Each experiment can adapt the plan to their particular needs, although the time line and the structure of tasks will be synchronized across the selected experiments. The duration of a proposed experiment should be less than **12 months** covering all phases. We expect that new partners join the BonFIRE consortium and start their activities on September 2012.

**Topic b) Cloud provider**

The profile of the company we are looking to engage with is a private/public cloud infrastructure provider with access to their own platform and the ability to support the creation of a new BonFIRE site on its infrastructure.

The rules of participation are the same as for any FP7 project.

The successful candidate will give access to their platform via programmable OCCI-based APIs and web-based interfaces and have enough capacity to host a lab-like project environment.

The new provider should expose access to their resources by means of the Open Cloud Computing Interface (OCCI) to be accessed from the BonFIRE broker and become an additional BonFIRE site.

On the other hand, as another type of test, it will also have the install the BonFIRE stack (broker and portal). The provider should be able to analyze and report back on issues raised and deployment errors that might be encountered within the work of the project.

The activities to be carried out in the project related to this call are the following:

- Provide access to their platform via programmable API (OCCI-based) and other web interfaces.
- Provision a dedicated lab-like project environment where experiments can be deployed.
- Provision normal operational support for this environment.
- Install and run the BonFIRE broker and portal in its environment in order to validate of the project developments (Proof of Concept).
- Support the technical and business activities in the project, by:
  - Contribution to general project requirements from its commercial point of view.
  - Contribution to identification of the business potential of the project’s experimental testing services in the cloud also including the analysis of its own business.
- Report the necessary effort and costs according to FP7 rules and management practices requested by the Coordinator.

**Estimated costs and funding for the tasks**

Total available funding in this call: **600,000€** of which

- 100,000 € (max) are allocated for the inclusion of a Cloud provider [topic b)]
- And approximately 50% of the remaining amount is especially reserved for experiments including scenario 3 from topic a) in its target research.

We estimate to fund about 4 experiments in total [topic a)] and a Cloud provider [topic b)]

Estimated total EC funding available per experiment: **€100,000 (typically) - 150,000€ (max)**

**Call identifier:** BonFIRE-2- New experiments and Cloud provider

Language in which proposal should be submitted: **English**

**Call closure:** March 7th 2012 at 17h00 (Brussels time)

For further information: [www.bonfire-project.eu](http://www.bonfire-project.eu) and bonfire [at] bonfire-project.eu

**Public Information-Day about FIRE project calls:** -- TBC

Mail address for the submission of proposals only: submissions [at] bonfire-project.eu

(The subject of the mail should indicate the Call Identifier)
Annex I Facility outline and available capacity

General available capacity to be accessed

<table>
<thead>
<tr>
<th>Partner name</th>
<th>Dedicated resources</th>
<th>On request resources</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Computing / Storage</td>
<td>Computing / Storage</td>
<td></td>
</tr>
<tr>
<td>EPCC</td>
<td>2 nodes x 48 cores (2.3GHz), 128GB RAM, 2TB disk</td>
<td>n/a due to extension of dedicated resources</td>
<td>XEN</td>
</tr>
<tr>
<td>USTUTT</td>
<td>4 nodes x 4 cores (3.2GHz), 2GB RAM, 6 nodes x 2 cores (2.6GHz), 8GB RAM</td>
<td>Initially 18 x dual-core 2.26 GHz CPUs (4GB RAM), Later additionally, 54 x dual-core 2.26 GHz CPUs (8 GB RAM)</td>
<td>XEN</td>
</tr>
<tr>
<td>IBBT</td>
<td>8 nodes x 2 cores, 4Gb RAM, 4 x 80GB storage</td>
<td>92 nodes x 2 cores (2.0GHz) /4GB RAM, 8TB storage attached as repository</td>
<td>Nodes integrated in Virtual Wall</td>
</tr>
<tr>
<td>HP</td>
<td>32 nodes x 4 cores (3GHz), 8GB RAM, 5 TBb SAN</td>
<td>96 additional nodes many with 64 GB RAM / 32 TB Shared</td>
<td></td>
</tr>
<tr>
<td>INRIA</td>
<td>4 to 8 2x4 cores with 8GB memory and 600G disk</td>
<td>Initially 162 nodes (1,800 cores), Up to 1544 nodes (5608 cores)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Initial map of permanent and on-request resources.
Base technical and high level architecture (second release).

Figure 2: General architecture of BonFIRE solution (2nd release). Six accessible testbeds (as Cloud infrastructure sites) are foreseen.
Annex II Experiment Management Structure and integration in BonFIRE

The funded experiments shall be semi-autonomous. Each new partner organisation is expected to be responsible for delivering the required administrative information, both regarding the EC and the BonFIRE admin management as well as any content (deliverables) required of them under the contract. A general experiment manager in BonFIRE will ensure that deadlines are met, resources are used as initially indicated and that the agreement regarding infrastructure use is met by both sides.

The partners of the experiments will become members of the consortium and therefore assume the normal responsibilities of effort reporting, project reviews and so on. The new partners will have to sign a Consortium Agreement. Each selected experiment will become a new workpackage under the Activity 5 of BonFIRE.

Experiments standard tasks

Experiments will consist of four phases, each constituting a task, with a fifth task (dissemination) running in parallel during the second half of the experiment. ‘Control points” will be established to verify the progress of the work:

Task 1 – Motivation and Design

Experimenters are expected to have clear ideas on experimental aims and methodologies when they apply. What will not be so clear is how to implement this methodology on our infrastructure. If the experimental methodology is analogous to a chemist’s plan to mix two liquids and distil the product, the experimental set up is the description of the apparatus, quantities to be mixed, temperature to be applied etc. In the case of BonFIRE this covers functionalities required and how the virtual machines will be deployed. This is submitted as an internal deliverable for analysis, discussion and approval with the operations team and represents the first control point.

Task 2 - Experimental set up

Experimenters follow their plan, integrating their components and preparing the necessary software in the Virtual Machines to be deployed. The necessary capacity and planning of the experiment (several tests) is requested.

Measurements to be collected by the BonFIRE monitoring need to be specified.

The completion of the experiment construction will be considered a control point.

Task 3 – Execution and subsequent iteration

Experimenters then run the experiment and collect the ensuing data. Analysis is conducted as required for the following iteration to be carried out, revisiting Task 2 if necessary. The end of the final iteration is a control point.

Task 4 - Experimental write up

It is a general report that describes the aims of the experiment, the hypotheses tested, the methodology followed, the data recorded, analysis of the data, conclusions and suggested follow on work. This latter element is a usual part of experimental write-ups. It discusses limitations of the methodology, what could be improved if it were to be repeated and what might be the subsequent hypotheses to explore. This is the final control point.
For the funded experiments, this final report will be public to be used as an example or show case.

**Task 5 – Dissemination and Case studies**

This consists in the normal dissemination actions (papers, press releases, etc). This will be supported by the general dissemination of BonFIRE project. Top experiments would be promoted for the production of a professional case study to be used in the subsequent dissemination efforts. These would be of highly professional quality that could be syndicated across top online IT magazines and mailing-lists.

These four control points are mapped as follows:

![Common task structure and Gantt chart for experiments](image)

BonFIRE will allow each experiment to run semi-autonomously. Each experimenter is free to operate as they see best provided they comply with agreements regarding use. However BonFIRE will ensure that the work progresses in order to reach these control points on time and to make sure that any problems are resolved and any needs met regarding the integration with the infrastructure.

It is important to insist on meeting the target of control points because it allows other areas of the project to align their activities, such as the release of new functionalities or dissemination events.