ARCADIA

Newsletter Vol. 1— June 2015

A Novel Reconfigurable By Design Highly Distributed Applications Development Paradigm Over Programmable Infrastructure

Editorial

Dear Readers,

Welcome to our first issue of ARCADIA Newsletter that we would like to present to you! With our semi-annual newsletters we will keep you regularly updated with the progress of our project and make you aware of news related to ARCADIA, which we hope will be of interest to you.

In this first issue, we have prepared the following selection of articles in order to introduce you EU-funded project ARCADIA, its objectives and activities:

♦ Arcadia scope, details & concept design
♦ Objectives
♦ Dissemination activities in NET FUTURES 2015
♦ Plenary meeting in Berlin
♦ Upcoming Plenary meeting in Oslo

We will regularly keep you updated with the most recent news about the status of the project. Additionally, each issue will include the consortium dissemination activities and a recommendation of conferences that might be of interest to you. Moreover, we kindly invite you to also regularly consult our website: http://www.arcadia-framework.eu

We are happy to invite you to follow our activities with this newsletter and we are looking forward to your feedback.

Yours sincerely,

The ARCADIA consortium

ARCADIA scope

A novel, powerful tool will be soon available to software developers, allowing them to take full advantage of the modern network and computer infrastructures. The majority of these infrastructures offer a wide range of configuration options and capabilities that can be programmed using the suitable commands or applications. Nowadays, the behaviour of devices and equipment can be deeply affected programmatically, concerning their energy efficiency, their flexibility in adapting to changing conditions and their functionality in general. But in most cases, this also requires a deep knowledge of vendor specific tools or technology specific parameters, while it is not humanly possible to intervene every time a new situation has arisen.

The ARCADIA platform will introduce an innovative way of tackling such issues. The basis will be a model describing all the characteristics of the infrastructure and the related actions that can be performed. The model will also include a great variety of application features that the developer would like his application to have. By using a well defined annotation language, the developer will be in position to label the application needs and to control its behaviour in a high level way. E.g. if requirement for only local access is set, the platform will automatically make the necessary network security settings and will restrict the incoming and outgoing traffic of the application.

Details & Concept design

The main role in this process belongs to the Smart Controller, the entity that includes functionality for configuring, deploying and reconfiguring if needed a Highly Distributed Application. In particular, it has the ability of interpreting the ARCADIA metadata and translating it into specific actions concerning the underlying resources. There is also the capability to communicate with another Smart Controller in case more resources are needed, without any human intervention. And of course, the platform is monitoring everything so as to guarantee that the optimum configuration has been selected, the application requirements are met and any policies set by the infrastructure provider are respected.

The partners of the project consortium envisage that the final outcome will offer to application developers the desired simplicity in building solutions with enhanced flexibility, availability and security characteristics. It is expected that ARCADIA platform will be warmly adopted by the programmers community, since it can provide independence from vendor specific tools, reduced product development costs and accelerated time to market, as well as access to useful network and service functions in a unified and easy to use way, just by incorporating some relevant annotations into the source code, according to the ARCADIA software development paradigm.

ARCADIA Objectives

- Leverage the re-configurability aspects of highly distributed applications
- Incorporate technological and business requirements coming from the industry, the research community, the software development enterprises and application users
- Build a flexible and scalable framework for developing and deploying highly distributed applications over programmable and re-configurable infrastructure.
- Facilitate the design of highly distributed applications over programmable infrastructure
- Design and develop a sophisticated Context Model that will conceptualize dynamic configuration and programmable aspects of underlying resources that are required by HDAs
- Implement an associated IDE plugin that will assist Developers to use the Context-Model in a "proper" way.
- Facilitate the development, deployment and dynamic configuration of highly distributed applications over programmable infrastructure based on the conceptualization and instantiation of a Reference Framework
- Prove the applicability, usability, effectiveness and value of the ARCADIA concepts, models and mechanisms in industrial, real-life networking and computational infrastructures, services and applications,
- Demonstrate and stress-test the developed ARCADIA artifacts under pragmatic conditions against a pre-defined set of use cases.
- Ensure wide communication and scientific dissemination of the innovative ARCADIA results to the research, academic, and international community
- Achieve the efficient exploitation and business planning of the ARCADIA concepts and tools to the market in order to identify end-users and potential customers.
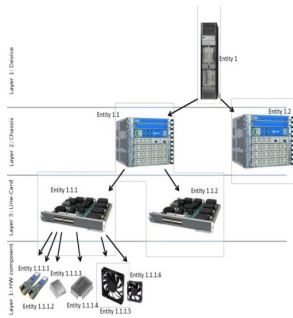
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Use Cases for the Arcadia framework

## Energy Efficiency vs Quality of Service (QoS) trade-off

Energy efficiency is a top priority of all infrastructure manufacturers and providers, but it can create implications for the Quality of Service (QoS) / Quality of Experience (QoE) of the provided services and applications. Furthermore, the various policies set by the network administrators and service providers have to be taken into account. This is one of the challenges that are going to be addressed during the ARCADIA project. Sophisticated distributed control/management techniques can be realistically deployed to dynamically shape the allocation of resources and relocate applications and network functionalities, trading off QoS/QoE and energy at multiple granularity levels.

Security and Privacy Support in the FI-WARE Platform

FI-WARE is an innovative, open, cloud-based infrastructure for cost-effective creation and delivery of Future Internet applications and services, at a scale not seen before. FI-STAR is an instantiation of the FI-WARE platform providing application modules, re-usable generic and health care sector specific functionality. The Arcadia framework will extend the TUB FI-STAR Ser-
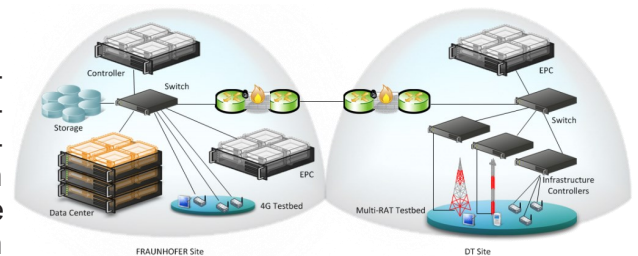
High Performance Survivable Communications in Distributed IoT Deployments

This use case is related to 6inACTION, an advanced system designed to provide public safety agencies with a survivable, scalable and robust communications, as well as professional IoT-supported management services during day-to-day operation and disaster relief missions. The ARCADIA platform will allow the establishment of virtual channels enabling the transparent communication via one or more available networks. Moreover, ARCADIA will allow the (almost) instant fall-back in case of extreme conditions causing failure of an individual network, thus offering a very high availability.

Participation to the Net Futures 2015

Members of the ARCADIA consortium have attended the Net Futures 2015 event in Brussels. The conference was focusing on two concepts that will profoundly affect the network communications market, creating chances for innovators and start-ups and altering revenue streams with a shift from hardware toward software and services, namely Software-defined networking (SDN) and Network Functions Virtualization (NFV).

It is envisaged that SDN and NVF will do for networking gear what app stores did for smart phones. In an SDN-enabled network with NVF capabilities, service providers can create and use any number of applications that can cut their OPEX and CAPEX, improve customer experience, and deliver new monetization opportunities.

1st plenary meeting and 1st technical meeting

The 1st plenary meeting of the ARCADIA project took place in Berlin from 19 to 20 of May 2015. It was organized by the Technical University of Berlin (TUB). All the partners were represented and the involved people had the chance to share their knowledge and to plan their next steps in progressing the project.

The next meeting is a technical meeting and will be held in Oslo from 6 July to 8 of July 2015. It will be organized by SINTEF. The main issues for discussion will be the
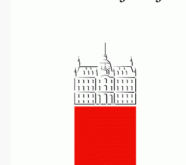
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