BOF Title: Computing Research Testbeds as a Service: Supporting large scale Experiments and Testing

Organizers:

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Abstract (Maximum 100 words):

This BOF discusses the concept of a Computing Testbed as a Service supporting application, computer science, education and technology evaluation usages that have different requirements from production jobs. We look at lessons from projects like Grid5000, FutureGrid, OpenCirrus, PlanetLab and GENI. We discuss 1) the requirements that Computing Testbeds as a Service need to address 2) The software needed to support TestbedaaS and a possible open source activity and 3) interest in federating resources to produce large scale testbeds and what commitments participants may need to make in such a federation.

BOF Proposal (Maximum 500 words):

This BOF proposal partially grew out of a recent July 2012 NSF sponsored workshop INCISE2 (building on an earlier report <https://www.acis.ufl.edu/docs/INCISEFinalReport.pdf>) on the instrumentation needed to support Computer Science research. It also builds on experience from Grid5000, FutureGrid, OpenCirrus, PlanetLab and a workshop at SC11 “Supporting Experimental Computer Science” with report <https://portal.futuregrid.org/references/supporting-experimental-computer-science>. There are several types of work for which large facilities are needed for testing and experimentation. These include the four dominant usages of FutureGrid: a) Computer Science, b) Technology evaluation and testing, c) Application development and d) Education. A key requirement for testbed usages include the need for shared facilities as any one user of a Computing Testbed tends not to need the long term dedicated access typical of production systems. Other characteristics include interactive use and the need for large systems for scaling tests. These usages also need a broad range of provisioning as usages probe the three levels IaaS (Infrastructure as a Service including hypervisor and bare metal), PaaS (Platform as a Service broadened to all middleware tools and environments) and SaaS (Software as a Service covering applications and System Services like SQLaaS). Experimentation also needs access to diverse resource technologies such as Infiniband and Gigabit Ethernet networking, different storage architectures (including Lustre and Hadoop File System styles), GPU enhanced nodes and other specialized architectures. This BOF will explore ways that such testbeds have been supported up to now and also possible future models. We will cover requirements, operational and software issues and mechanisms for supporting the needed scale and diversity of hardware resources. We will examine the particular software that Testbed as a Service might need. This includes ability to dynamically provision nodes, image management systems with ability to target both bare metal and the different hypervisors and different virtual machine managers like Eucalyptus, OpenNebula, OpenStack and Nimbus. Support of provisioning both nodes and virtual clustering, appliances and virtual networks is needed. At a higher level tools for experiment management could be important as are a broad range of documentation and tutorials. We will capture experiences from existing computer testbeds and from the GENI activity that supports related Network Testbed as a Service. We will discuss possible international consortia that would enable open source development of the needed Testbed as a Service software and the possibility of building larger testbed by federating resources from different sources. We will discuss the nature of such consortia and the types of agreements that would be needed between sites that federate resources for a large international testbed.

Description of the session format (Maximum 100 words):

The session will consists of short introductory talks covering experiences and future suggestions from existing projects including Grid5000, FutureGrid, OpenCirrus, PlanetLab and GENI. These will be followed by discussion between speakers and BOF participants. This will focused on the organizing topics of the BOF. Namely 1) the requirements that Computing Testbeds as a Service need to address 2) The software needed to support TestbedaaS and possible open source activity and 3) interest in federating resources to produce large scale testbeds and what commitments participants may need to make in such a federation.