A Software Workbench for Developing, Deploying and Controlling Time-critical Cloud Applications


*BEIA Consult International SRL, Romania
bWellness Telecom SL., Spain
cMOG Technologies SA, Portugal

1. What is SWITCH?

The software workbench for interactive, time-critical and highly self-adaptive cloud applications (SWITCH) [1] is a Horizon 2020 project that will provide tools for managing the complete lifecycle of time-critical applications within the Cloud, explicitly linking user-level QoS with programmable infrastructure and autonomous runtime monitoring and control.

2. Background

Time-critical applications are required to respond immediately to a range of events that may occur at runtime. Often the quality of service (QoS) given directly impacts business value (e.g. for multimedia platforms) or public safety (e.g. for disaster response). Many such applications are distributed and highly demanding. Cloud environments provide on-demand virtualized infrastructure that could support such applications, but there is a lack of tools for exerting fine-grained control over software-defined infrastructure and applications at runtime.

3. The SWITCH approach

The SWITCH workbench will provide tools for developing, deploying and controlling the execution of time-critical applications, supporting every stage of the application lifecycle. It will realise an application-infrastructure co-programming and control model that relates application logic, QoS constraints, and developments in programmable infrastructure. The workbench has three subsystems, as presented in Fig. 1:

1. The SWITCH Interactive Development Environment (SIDE), to specify applications for deployment on Cloud.
2. The Dynamic Real-time Infrastructure Planner (DRIP), to plan and provision applications on virtual infrastructure.
3. The Autonomous System Adaptation Platform (ASAP), to monitor and intercede in the execution of applications.

The modularity of SWITCH allows components to be replaced as new Cloud standards and technologies come into existence.

The SWITCH application lifecycle is split into a number of interlinked phases, as presented in Fig. 2.

4. Time critical application cases and requirements

SWITCH has three pilot cases, each with different time-critical requirements and business case for moving into the Cloud:

- A collaborative business communication platform (Wellness Telecom) that provides browser-based real-time communication and collaboration that scales to demand while minimising costs;
- An elastic disaster early warning system (BEIA Consult) that continuously monitors a sensor network, identifies events in progress, and upscales facilities in anticipation of user demands;
- A cloud studio for directing and broadcasting live events (MOG Technologies) that manages the streaming of video feeds and the production of the broadcast stream virtually rather than on-site.

References


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