Dynamic Exception Handling for Partitioned Workflow on Federated Clouds

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Introduction

My research focus on security and dependability: introducing a new automatic method for dynamically partitioning applications across the set of clouds in an environment in which clouds can fail during workflow execution. The method deals with exceptions that occur when clouds fail, and selects the best way to repartition the workflow, whilst still meeting security requirements. This avoids the need for developers to have to code ad-hoc solutions to address cloud failure, or the alternative that an application will fail when any cloud fails.

The method has been implemented in a tool which exploits e-Science Central: a portable, high-level cloud platform.

Methods

- We extend the method introduced in [1] for partitioning workflows across a set of clouds in order to meet security requirements.
- DMI [2] (Dependable Multiparty Interaction) framework to handle concurrent exceptions and synchronisation for deployed partitions that co-operate together to execute a cooperating activity; it is then be extended to the partitions that are deployed on a set of clouds.
- The figure below shows DMI applied to workflow partitioned over a federated cloud.

![Diagram of DMI applied to workflow partitioned over a federated cloud]

The figure below shows the architecture of the tool, which indicates how the Deployment Manager communicates with a range of e-Science Central instances. Deployment Manager generates several validated options by applying the method described above to a workflow, and then distributed to the selected e-Science Central instances.

In addition, the Deployment Manager could also monitors the availability of the clouds and the status of the running workflow partitions. This allows the Deployment Manager to select dynamically between possible workflow partitions according to the availability of the clouds, and to handle exceptions generated by the running partitions automatically.

Conclusion

- We have designed a new method, which is used to automatically deal with the exceptions happening at a workflow running over a set of clouds.
- We have applied the Method onto e-Science Central- a cloud-based platform.
- The test cases are designed to evaluate the system.

References