

A study on the application lifecycle management over SOA based application hosting platform

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Abstract — We introduce the application hosting platform which is based on the SOA(Service-Oriented Architecture) and a mechanism for application lifecycle management. Using functionalities of this application hosting platform, the third party application providers can develop their applications by composing service components and provide them easily without constructing their own platform environment. The application hosting platform supports service composition based on SOA, application deployment and management. In addition, the application providers can manage the lifecycle of their applications through the management service portal easily. In the hosting model, the management facilities for the 3rd party application providers are essential. We address the portal based management for the 3rd party application providers and describe the management flow in this paper.

Keywords — Service-Oriented Architecture(SOA), hosting, platform.

1. Introduction

With the rapid evolution of computing technology, lots of end user applications have been introduced to the market to satisfy various users' requirements. The SOA (Service Oriented Architecture) is one of the key mechanisms which enable service developers to create new applications rapidly using existent service component with high reusability. In this paper, we propose a mechanism for the 3rd party service providers to manage the lifecycle of their applications on the SOA-based application hosting platform.

The SOA-based application hosting platform provides the core functionalities for the 3rd party service providers who don't have their own platforms. It supports one of the application hosting business models by providing service composition, execution, and management functionalities which are necessary for service providers to introduce their applications to end users. Using the functionalities of the platform, the 3rd party service providers could create their applications and launch them into the market rapidly.

We introduce the SOA-based application hosting platform briefly and describe a mechanism application lifecycle management for the 3rd party service providers over the platform. In this paper, we use the term 'application' for expressing the application service which are used by end users and use the term 'service' for a reusable service component in SOA environment.

2. Application hosting platform

2.1 Application Hosting Platform

The application hosting platforms deploys the applications of 3rd party service providers and executes, manages them on behalf of the service providers and even charges end users for their usage.

The 3rd party service providers can create applications by composing service components in the service repositories, deploy and execute them on this platform environment without their own service platform. In addition, they don't need to worry about maintenance of the service platform since the platform operator administrates the platform.

The SOA-based application hosting platform needs to provide the following functionalities:

- Service discovery, composition, and service execution environment including functionality for reusing service components
- Application execution environment including facilities which are needed for executing applications
- Application management including data profile management, application lifecycle management, access control, policy evaluation/enforcement, and ID management
- External management interfaces for 3rd party providers and platform operators to manage applications and related data remotely

The figure 1 shows the overview of the application hosting platform. The users of this platform can be categorized into end users, service providers, and platform operators. It has execution environment including WAS (web application server) and ESB (enterprise service bus), data repositories for user profile, service profile, application profile, and other management facilities for the maintenance of the platform.

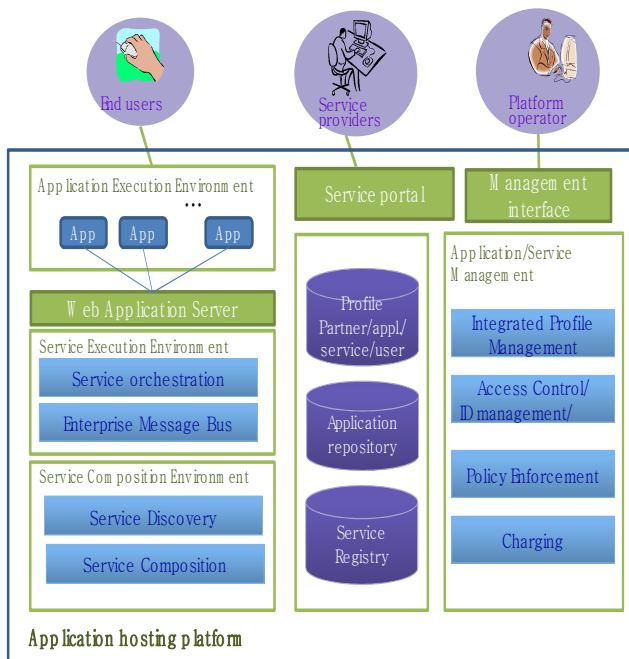


Figure 1. Module view of Application hosting platform

The service portal and management interface in the Figure 1 are key entities providing the 3rd party service providers with the interface of application lifecycle management. They handle the requests of the service providers and process the requests by interworking internal functional entities. The 3rd party service providers who are authorized to the platform can access the service portal through the web site, manage their applications, and monitor the status of their applications.

2.2 Business model for Application Hosting Platform

With this application hosting platform, the business model shown in Figure 2 is possible. There exists the hosting service provider in the core of this business model which bridges every stakeholder.

- **Application providers**
Application providers are the user of platform hosting service. They develop applications with enablers and service components and have the applications hosted on the hosting provider's platform. They don't need to care about the maintenance of underlying platform facilities and only pay the hosting fee to hosting providers.
- **Application hosting service providers**
They own application hosting platforms, host applications, and operate the platforms. To provide communication related functions to applications, the functionality of related network resource is needed. Hosting providers pay the network operators for usage of the underlying resource such as network capabilities, and billing functionalities. In addition to the network capability, other capabilities from other platform service providers such as Google and Naver, which the

platform doesn't own, can be used. The hosting providers can use the IT infrastructure provided as cloud services and pay per use.

- **Other platform service providers**
IT service providers such as Google and Naver can provide functionalities in the form of web services. The main example is Google MAP service.
- **Cloud service providers**
The cloud service providers provide the virtualized physical resources, virtualized infrastructure as well as virtualized middleware platforms[5] for hosting providers to construct the platform environment.
- **Network operators**
The network operators support the network capabilities such as call control, presence, and charging.

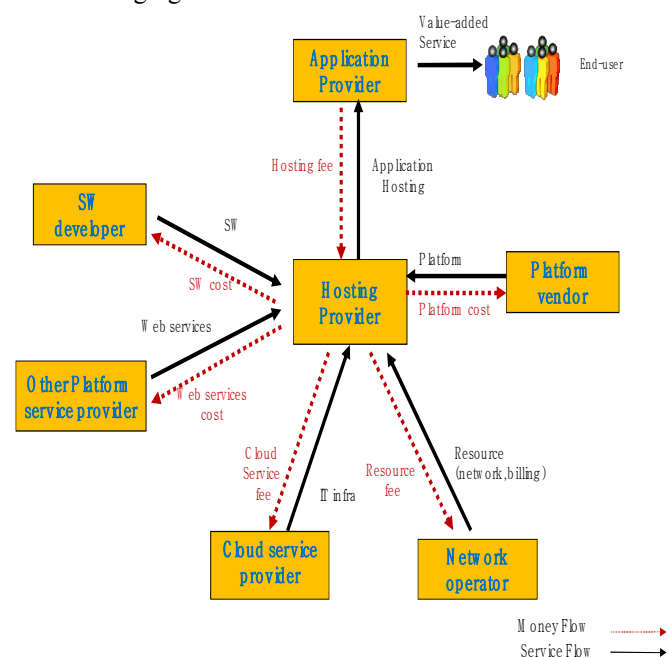


Figure 2. Business model for Application hosting platform

3. Application lifecycle management

3.1 Application lifecycle

We define the lifecycle of an application as following 6 phases.

- **Design/implementation phase**
In this phase, service providers design new applications, search reusable service components, compose discovered service components, and complete the whole application logic.
- **Registered phase**
After implementing the applications, the service providers request the platform operator of register their applications

through the service portal. The platform operator is notified of the request and approves the request. And then the service providers register profile data for the new applications.

- Active phase

When an application is ready to run, the service provider requests to start running the application through the service portal. This request is forwarded to the platform operator and the operator approves to start execution of the application and takes actions to execute. Since the application consists of several service components, the application can be activated when all of the service components in the application are active.

- Updating phase

During active state of the application, the application can be modified and updated. In this phase, the current application can continue to run until the new version is deployed dependent on the configuration of the system.

- Stop phase

The application can be paused when the service provider decides to stop the provision of the application. On this phase, the application may retire or may be restarted dependent on the service provider's decision.

- Deleted phase

The application and related data are removed from the platform.

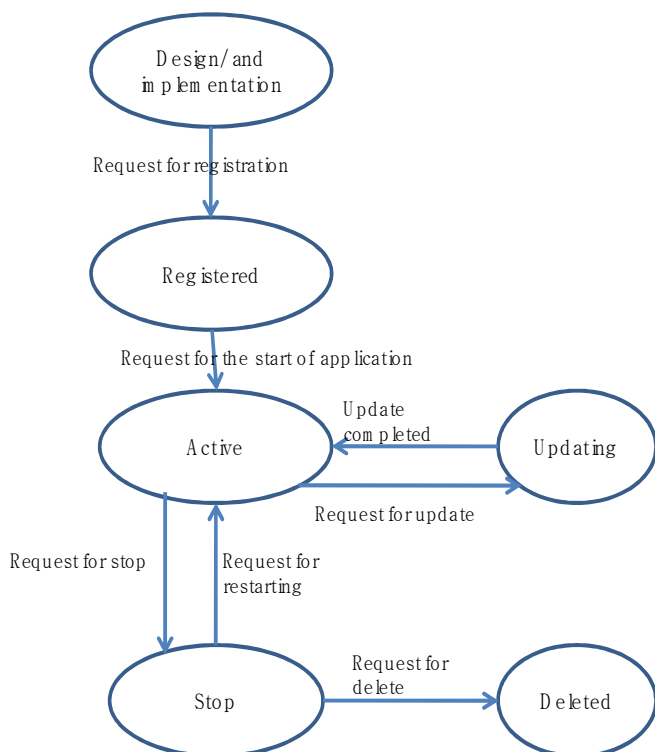


Figure 3. Lifecycle of an application

The status of an application is saved into the application profile and updated as the application changes. The lifecycle

of the application is managed by the application's owner, that is, the 3rd party service provider through the management portal.

3.2 Application lifecycle management

Figure 4 shows the relevant modules inside and outside the platform for application lifecycle management. The management portal plays a role of bridge between the service providers and the hosting platform. The portal provides the browser user interface for remote access for the service providers and the platform operator. The portal allows the access to the resources according to the user level and authorizes users who try to manipulate their resources such as their applications and relevant data.

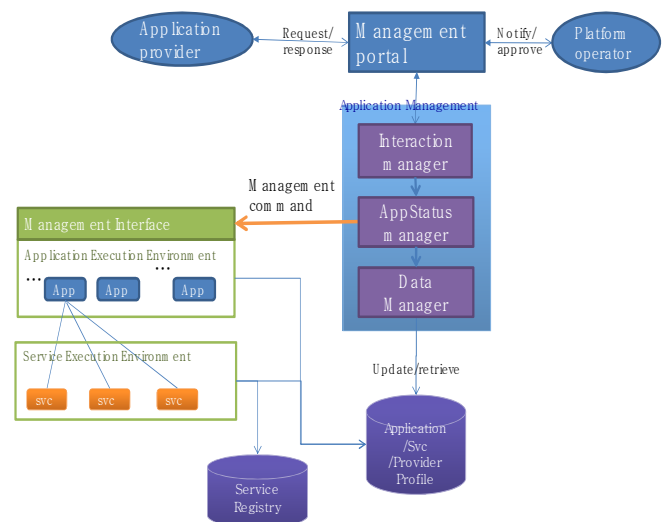


Figure 4. Application management architecture

Inside the platform, there is an application management module which processes commands from the management portal. The application management module consists of the following submodules.

- Interaction manager

- Authenticate & Authorize portal uses
- Forward management commands to appStatus manager
- Retrieve requested information from data repositories

- Application status manager

- Application status management
- Deploy/run/stop applications using management API provided by execution environment

- Data manager

- Access data repositories containing application profile, user profile, and service profile

- Manipulate data related application lifecycle management

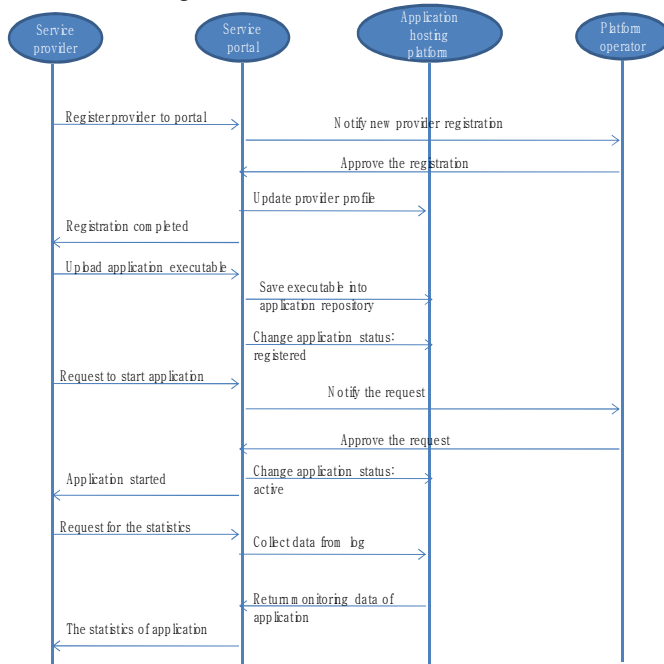


Figure 5. Sequence diagram for application lifecycle management

Figure 5,6 describes the detail procedure for application lifecycle management through the management portal, especially about managing early stage of an application.

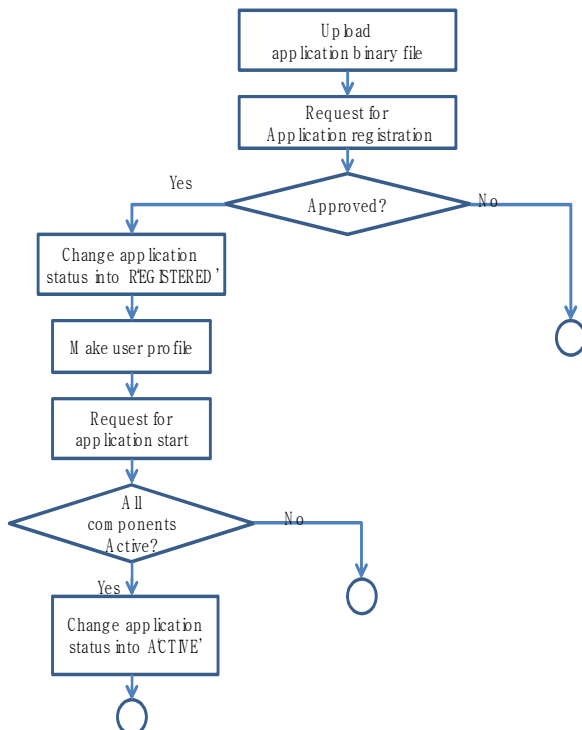


Figure 6. Flow for activating an application

To access the management function, the 3rd party application provider should be registered to the management portal and this is done by request and being approved by the platform operator. If the registration finish, the application provider begin to deploy the application to the platform by uploading executable. With approval of the platform operator, the application provider starts the lifecycle of his application through the management portal.

4. Conclusion and future works

In this paper, we introduce a mechanism for the 3rd party service providers to manage the lifecycle of their applications in the application hosting platform. The application hosting platform is based on the SOA technology and enables the service providers to create new applications easily with high reusability. In addition, the management portal gives them a way to manage their applications without the burden of platform maintenance. For further study, we need to evaluate this approach by launching the implementation and elaborate this mechanism.

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