

Cisco Application eXtension Platform

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OSGi Add-On as Universal Middleware for Your Applications

Introduction

The Cisco® Application eXtension Platform (AXP) offers a Linux/Java platform. To take full advantage of AXP, companies and developers must have a standardized, component-oriented platform for Java-based software-and such a platform is offered by the open standards OSGi Alliance. The OSGi platform solves the dynamic loading, versioning, and lifecycle management issues for Java-based services and also provides services to develop an ecosystem around it.

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If you are using the open-source Eclipse 3.0 framework, you are already using OSGi indirectly. When Eclipse-based applications became more complex, Eclipse needed an appropriate framework that could provide a dynamic, modular, and flexible run time. The Eclipse group found that the OSGi framework satisfied most of their requirements. The Eclipse 3.0+ plug-in framework is based on OSGi. Eclipse's use of OSGi caught the attention of the developer community and continues to evolve.

Industry Trends

Many developers are looking for open platforms and open standards. The OSGi Alliance is working to realize the vision of a "universal middleware" that addresses issues such as application packaging, versioning, deployment, publication, and discovery.

The benefits of OSGi are:

- The ability to have modularity through better separation of application logic into modules
- The ability to deploy multiple versions of a module concurrently
- The ability to dynamically discover and use services provided by other modules in the system
- The ability to dynamically deploy, update, and undeploy modules in a running system

Cisco and ProSyst: Creating the First OSGi-Technology-Equipped Router

Cisco and ProSyst are partnering to provide a single box solution on the integrated services router (ISR)-the first router that runs an OSGi framework.

ProSyst's mBedded Server, the optional OSGi add-on for Cisco AXP, is a high-performance and low-footprint OSGi Release 4 (R4) certified implementation with many valuable add-ons for various industry segments. Based on open standards from Java, OSGi (the JSR 232 specification), and the Open Mobile Alliance (OMA) specifications, mBedded Server is a middleware framework that offers highest security.

In more detail, the mBedded Server:

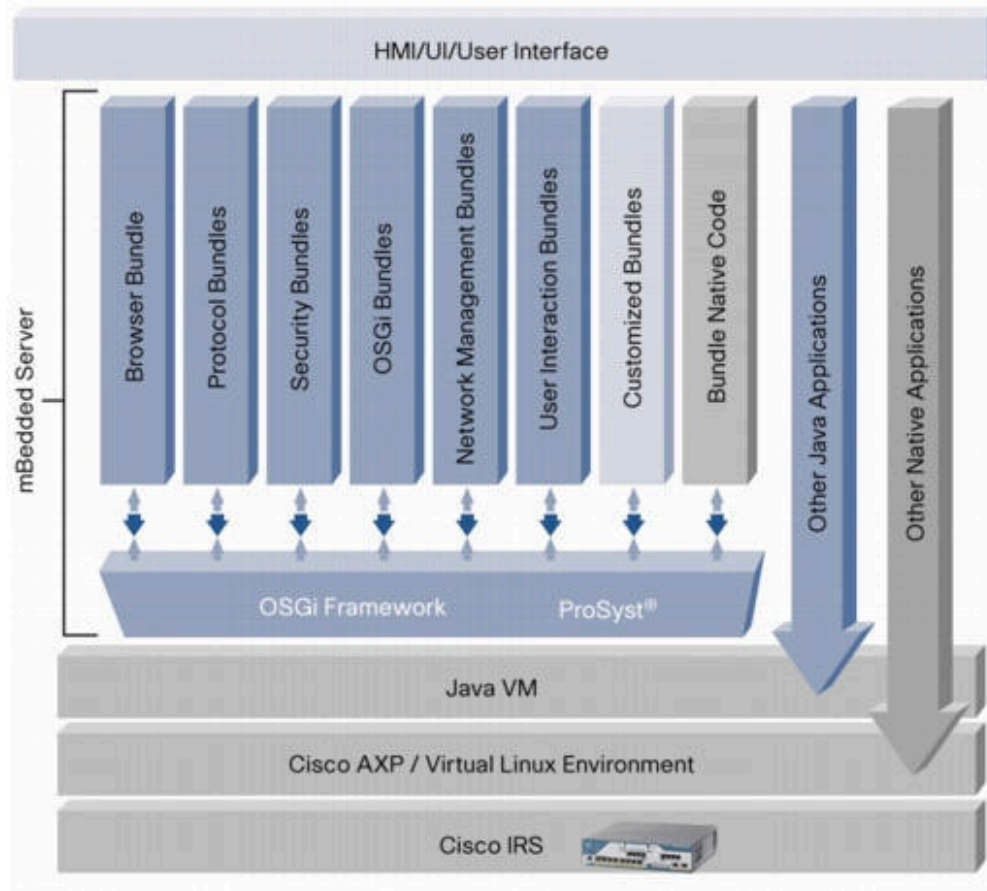
- Specifies a Java execution environment for software components
- Reduces the complexity of large applications by building them from a number of collaborating components
- Provides a dynamic model-components can be added and removed without requiring restarts
- Defines many standard component interfaces for common functions such as HTTP servers, configuration, logging, security, user administration, XML and many more

How It Works

ProSyst is a specialist in Java technology that runs on top of the Java Virtual Machine (JVM) layer. The whole solution- Cisco AXP plus the OSGi add-on-is an ideal combination that creates unique advantages for developers and customers deploying ProSyst on Cisco AXP inside an ISR.

Figure 1 shows how the ProSyst OSGi add-on mBedded Server fits in the overall architecture.

Figure 1. OSGi Architecture on Cisco AXP



The OSGi platform provides core framework and platform services. The core framework provides a run-time foundation to run and manage the lifecycle of various applications in a secured and modularized environment. The framework has four layers: security, modularization, lifecycle, and service.

The security layer provides additions to Java security that restrict the public and private exposure of packages and services. This layer also provides permissions to import/export packages and register/access services from the service registry.

The modularization layer handles class loading, versioning, and the import/export of packages. It also manages the dependency resolutions of bundles.

The lifecycle layer manages the lifecycle of bundles and provides a generic API abstraction to enable remote management in a variety of management models.

The service layer adds dynamic behavior to the OSGi platform in which bundles can come and go. The heart of this layer is a service registry in which services are registered and discovered. The framework handles automatic registration and deregistration and triggers lifecycle events. The OSGi add-on further provides a declarative model to express service registrations and dependencies in an XML declaration. This declarative framework supports lazy (delayed) loading of resources by loading them only when they're actually needed.

The OSGi ecosystem platform provides various service interfaces that can be implemented by vendors, depending on the nature of their applications. The OSGi framework may provide a permission administration service, conditional permission administration service, a package administration service, and URL handler service. The OSGi add-on offers various system services such as a log service, and administrative services for managing configuration, event administration, users, devices, and applications. The OSGi add-on also includes a HTTP service so that bundles can provide servlets that can be made available over HTTP. Besides declaration and event services, the solution offers an

administration service to manage configuration-based connectivity between a service provider and consumers, enabling data objects to be exchanged over the network.

AXP Product Overview

The Cisco Application eXtension Platform (AXP) provides a standards-based Linux hosting environment within the ISR allowing 3rd parties to integrate applications with the router. Tightly integrated, the AXP environment is configured and managed through the router. Harnessing this integration, an AXP application can appear to the end-user as an extension of the router.



The AXP Solution consists of:

- Application Runtime Network Module providing dedicated resources to host applications.
- Application eXtensions Platform Hosting environment providing the infrastructure to securely host, install, upgrade, manage and 3rd party applications and services.
- IOS Integration APIs allowing the application to integrate and leverage the features of the router.
- Software Developer Kit (SDK) allowing certified customers and partners to develop applications and services.
- AXP Partner Program provides the collateral, extended technical support and online resources to help partners, develop, deploy and market their AXP based solutions.

Highlights

The ProSyst mBedded Server, ProSyst's OSGi add-on for Cisco AXP, has been developed in partnership with Cisco. It sets new standards for performance and memory efficiency through several unique technology innovations. It is optimized for small platforms with limited resources. It comes with all warranties and liabilities rights that are necessary to ship devices to end users. The mBedded Server:

- Provides the ability to develop software that is much less dependent on the hardware and operating system used
- Allows the software to be structured as dynamic components that can be installed, started, stopped, updated, and uninstalled-even remotely-without affecting other components being executed within the framework
- Provides a reliable, secure environment restricting components to access only the resources and perform only the operations they are allowed to
- Is compliant with the OSGi R4 Core Specification
- Includes many features in addition to the OSGi R4 Core Specification, such as lazy initiation, resource management, JVM-specific optimizations, fault management, data and error protection
- Offers additional functionality packaged in bundles, including local tree database, control unit abstraction, JavaServer Pages (JSP) engine, Secure Sockets Layer (SSL)-enabled HTTP server, and so on
- Provides RAM and ROM optimizations
- Provides improved startup time
- Provides highest availability, scalability, and reliability



- Provides support of Eclipse plug-in model enabling deployment of embedded Rich Client Platform (eRCP) and RCP applications

Business Benefits

With all the features just described, developers benefit from improved time-to-market and reduced development costs because the OSGi add-on provides for the integration of prebuilt and pretested component subsystems. The technology also reduces maintenance costs and enables unique after-market opportunities because components can be dynamically delivered to devices in the field.

About ProSyst

A Java and OSGi pioneer, offers client- and server-side OSGi service platforms as well as the development of generic and custom applications. Manufacturers and service providers use the OSGi-based and certified technology to dynamically extend, manage, and secure platforms and to enable the creation of applications and functions as simple, interoperable, and sharable components. ProSyst offers products and services for all markets that use OSGi technology, including mobile devices, smart home, automotive, enterprise, and industrial applications.

Customers include Alcatel, Alpine, BMW, Bosch, Bombardier, BuschJaeger (ABB), CA, Epson, GM, HP, ICW, Motorola, Miele, Nokia, Philips, SAP, Siemens, Sprint Nextel, Telefónica, Telstra and Thales Alenia Space, and many more. The company was founded in 1997 in Cologne, Germany. ProSyst is a privately held company and employs 120+ Java/OSGi engineers. Contact on the Web at <http://www.prosyst.com>.



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