

Mobile Platform Products Supporting Use of Smart Devices

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Smart devices such as smartphones and tablets are coming to be applied in a wide variety of business scenarios both inside and outside the company thanks to their mobile and portable features. This revolution in work style centered about the use of smart devices was perhaps inevitable, but there are still many needs in system management and development such as enhanced security measures and efficient software development methods under multiple OSs. To meet these needs, Fujitsu provides a middleware product called FUJITSU Software Interstage Mobile Application Server (IMAPS) and a service platform called FUJITSU Cloud PaaS MobileSUITE (MobileSUITE). IMAPS enables the efficient development and operation of applications for smart devices by providing a multi-platform development environment, a secure application execution infrastructure, and a business operation environment for improving on-site productivity. MobileSUITE provides services that enable functions for content delivery and digital catalogs to be used immediately and also provides mobile device management (MDM) functions. Using these MobileSUITE services and functions in combination enables prompt support of situations requiring security measures. This paper introduces the features of these two products and presents examples of their application.

1. Introduction

The widespread penetration of smart devices such as smartphones and tablets is bringing about a work-style renaissance in a wide variety of business operations such as management, sales, manufacturing, and maintenance and checking.¹⁾

For example, the retail industry is dealing with a decrease in store traffic because of competition with network services, so new ways of conducting business using smart devices are being considered. These include techniques for encouraging customers to visit “brick and mortar” stores such as notifying them about sales or distributing coupons using dedicated applications, i.e., online-to-offline (O2O) commerce applications. They can also include methods for making business more efficient through on-site inventory/order management and effective use of customer information. Furthermore, in the manufacturing and construction industries, the use of smart devices at production sites and in maintenance and checking work is spreading. Smart devices can be used in the field to

display procedures and locations/points that need to be checked and to immediately input checking results or messages to be passed on to others. In short, the use of smart devices signifies a break from paper-based operations. It can prevent even beginners from making omissions and errors in operations and help make work more efficient, and it can provide a means of sharing and transferring know-how, which in the past was highly dependent on individual skills.

To facilitate the use of smart devices in business, Fujitsu provides the FUJITSU Software Interstage Mobile Application Server (IMAPS) middleware product and the FUJITSU Cloud PaaS MobileSUITE (MobileSUITE) service platform product, which are introduced in this paper.

2. Needs and issues in using smart devices

As described above, we can expect to see the use of smart devices in all sorts of business scenarios. However, smart devices are relatively new, so an extensive body of experience and know-how has yet to

be accumulated, and customers are expressing the following expectations and concerns from various standpoints.

2.1 Users and business managers

Users and business managers want to make their work more efficient and to speed up their tasks by leveraging the mobility and portability of smart devices to make them effective in diverse scenarios. For example, they would like to be able to work when visiting clients, when in the field or on the shop floor, and when moving from one place to another.

However, signal reception in such scenarios will not necessarily be good. There is therefore a need for some means of enabling work to continue even when signal reception is degraded or lacking. This can occur when the user is mobile, in environments having unstable signal reception such as basements, or in environments that block or prohibit mobile communications (hospitals, aircraft passenger areas, places that use precision equipment, etc.).

There is also a need for early development of systems oriented to smart devices, and applications must be easy to use and make use of the camera, GPS, and other functions characteristic of smart devices.

2.2 Application developers

In contrast to the needs of users and business managers, application developers are faced with development-related issues. In smart devices, applications run on a variety of operation platforms such as Android, iOS, and Windows in various versions, and development languages and available functions differ from one platform to the next. In addition, there are few experienced developers in this new field of smart devices, and the development of applications for each OS requires various types of knowledge related to smart devices and much time. Consequently, from the standpoint of application developers, there is a need for efficient development techniques and environments.

2.3 System managers

Security is the issue that worries system managers the most in the business use of smart devices. Users often take their smart devices with them when leaving the office to visit a client or a site in the field, so measures are needed in the event that a smart device

is lost or stolen. These measures start with basic user authentication and may include encryption of customer information and critical data.

2.4 IMAPS and MobileSUITE

To meet these needs in using smart devices, Fujitsu provides IMAPS and MobileSUITE. A customer desiring on-premise operation of a business using smart devices can select IMAPS and one who wishes to forego the trouble of constructing an environment on one's own can select MobileSUITE provided in a service format.

3. IMAPS features and application example

IMAPS is an open and secure mobile application server.²⁾ It provides a development environment supporting multiple platforms, a secure application execution infrastructure, and a business operation environment for improving on-site productivity. The following describes IMAPS features and presents an application example.

3.1 Multi-platform development environment

Applications for smart devices come in three formats: hybrid applications, native applications, and Web applications (**Figure 1**). IMAPS supports all three of these application formats so that the format most applicable to the needs of a particular customer can be provided. Of these, the most efficient format for development work is the hybrid application.

Hybrid applications for smart devices are developed using HTML5, JavaScript, and CSS3, which are standard, open languages that are used even in Web systems. A hybrid application can run on a number of OSs including Android and iOS. As a result, developers do not have to learn a new development language for each OS, and they can apply the knowledge and skills that they have acquired in the development of Web systems. IMAPS also provides a proprietary library of application programming interfaces (APIs) for user authentication, data encryption, log management, etc. and a mobile application development framework. A developer can take advantage of these features to create applications that support multiple OSs and multiple platforms without having to worry about controlling

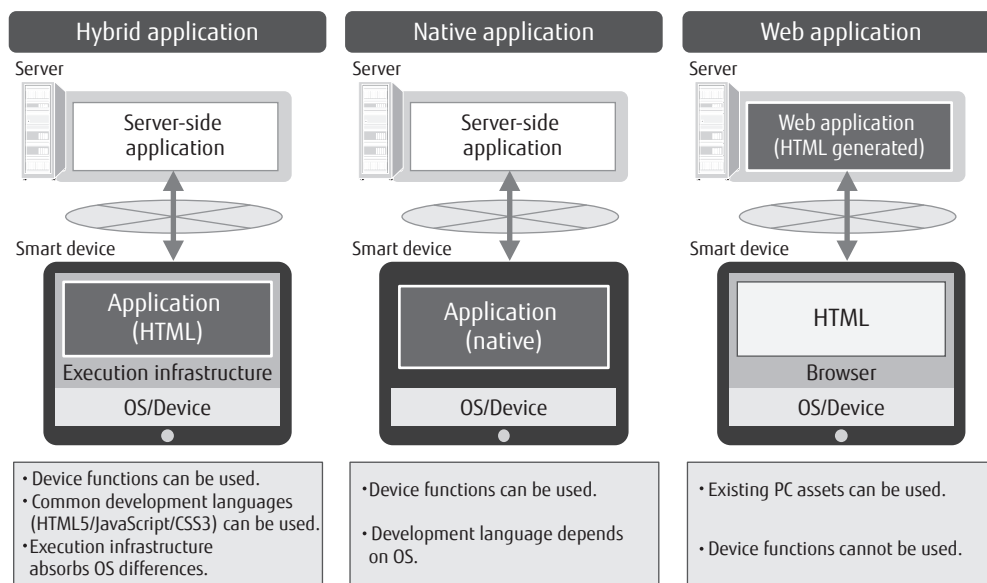


Figure 1
Application formats for smart devices.

the camera, GPS, and other device functions for which the behavior is model-dependent. In addition, IMAPS can reduce the development scale of an application by about one-half compared to conventional development environments (according to a Fujitsu survey).

3.2 Secure application execution infrastructure

IMAPS enables the user to select an authentication method appropriate to the format of a business operation so that user authentication can be reliably performed in a smart device. Specifically, IMAPS supports directory services such as Active Directory and database-oriented user authentication as authentication methods, and it also enables authentication systems that the user is already using to be used as add-ons.

In addition, IMAPS can encrypt data stored on a smart device including business data, customer information, and authentication information, and it can automatically delete data under certain predefined conditions such as a line-disconnect event. These measures prevent information leaks if a smart device should be lost or stolen and ensures a high level of security overall.

3.3 Business operation environment for improving on-site productivity

IMAPS provides a business operation environment that is unaffected by the communications state of the smart device. By storing data beforehand in the smart device, the user can continue to work even in an environment with poor signal reception such as when the user is mobile or in the field to perform on-site work, take inventories, etc. without losing access to the beneficial features of a smart device.

In IMAPS, a push function transmits information from a server to the smart device in real time so that messages can be delivered without having to depend on application initialization or user-instigated update operations. While Google Cloud Messaging for Android (GCM) provided by Google or Apple Push Notification Service (APNs) provided by Apple can be used as a message transmission method, Fujitsu also provides a high-reliability transmission method called "IMAPS push." This proprietary method provides highly convenient functions that GCM and APNs cannot, such as the transmission of a large quantity of messages, deferring and resending of messages, and checking for messages that have not yet been transmitted.

3.4 Log management functions for recording operations and troubleshooting problems

IMAPS provides extensive log management functions for recording application operations and analyzing problems. Logging APIs provided by IMAPS can be incorporated in smart device applications so that information can be collected on the server side. For example, if user operation history and internal processing are output to logs, an application developer or system manager can use these logs to quickly troubleshoot a problem that has just occurred or to perform various types of analyses as needed.

3.5 IMAPS application example: property appraisal

An example of using IMAPS for on-site appraisal of real-estate property is illustrated in **Figure 2**. In this example, an appraiser in the field uses the camera on a smart device to take a photograph of a property and sends that image to an expert in the office who also has a smart device. The expert then gives instructions to the appraiser while reviewing the image.

The expert may use his or her smart device to mark a specific area that needs to be checked in more detail before returning the image to the appraiser. In this way, two people can perform business in real time using a shared image. Having an expert convey instructions in real time via an image in this way can

prevent misunderstandings in instructions given to the appraiser and omissions in items to be checked.

The IMAPS development environment enables an application like this to be developed in only about 100 steps.

4. MobileSUITE features and future outlook

In contrast to IMAPS, which is provided as a middleware product, MobileSUITE is provided as a service platform.³⁾

MobileSUITE provides a full lineup of functions not only on the cloud side but on the terminal side as well. These functions are provided as a service oriented to content-delivery and digital-catalog applications, and they can therefore be used immediately by simply applying for the service. MobileSUITE also provides mobile device management (MDM) functions to keep the terminal itself secure, which means that security measures can be implemented quickly if needed.

In an environment in which smart devices are being increasingly used for business applications, MobileSUITE provides these functions for the Android, iOS, and Windows OSs. For the user, this makes for smooth implementation of these functions without having to worry about differences between OSs.

This section describes the main features of MobileSUITE and the future outlook for this service platform.

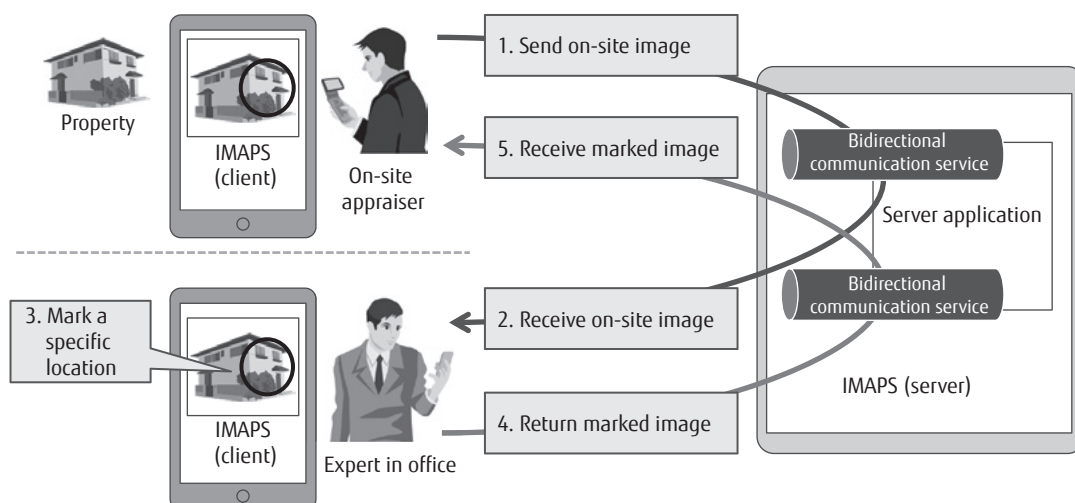


Figure 2
Property appraisal application.

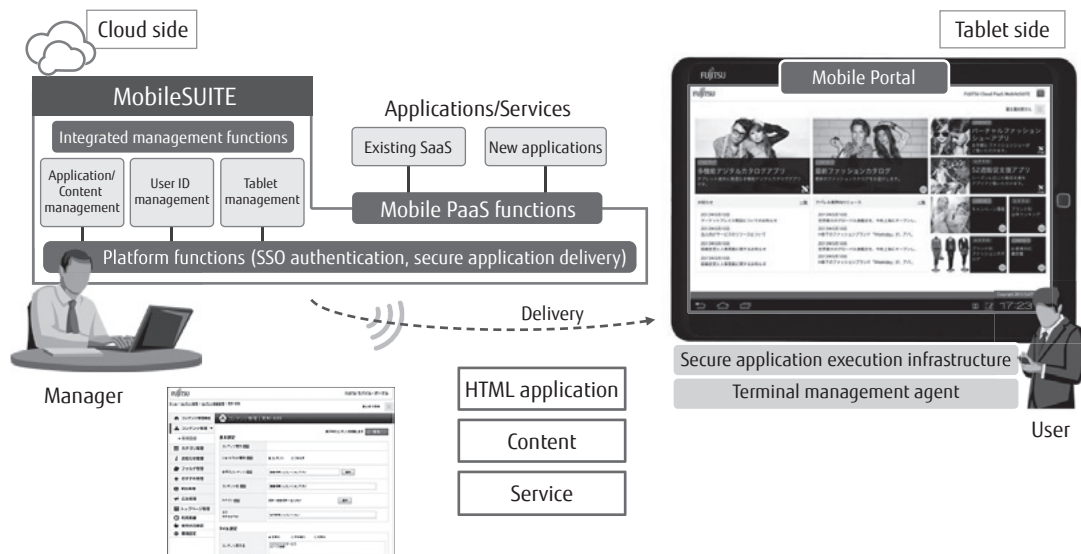


Figure 3
Overview of MobileSUITE.

4.1 Application/Content management functions

MobileSUITE provides application and content management functions. With MobileSUITE, a system manager can easily register and deliver an HTML application^{note)} and content (PDF files of catalogs, manuals, etc. and video too) from a management screen on the Web, and the user can immediately view and browse that content (Figure 3).

For example, a system manager who wants to deliver content to a user can do so by simply registering that content on a content management screen and arranging the content in the form of a screen layout. Furthermore, a system manager who wishes to deliver that content in a secure manner can encrypt it by simply checking the “Encryption” option on the screen when registering the content. The user can then view this encrypted content with an embedded file viewer provided by an application (Mobile Portal) on the terminal. This scheme reduces the risk of information leaks compared with the use of external viewers.

A major feature of providing content-delivery

note) This refers to the “Application (HTML)” section within “Hybrid Application” in Figure 1. Such an application runs as a hybrid application in combination with the execution infrastructure provided by MobileSUITE.

functions in this way is that they can be used immediately without having to develop any special applications.

In addition, even HTML applications created by developers can be easily delivered using the same mechanism as that for delivering content, which means that developers can devote their efforts to application development. HTML applications can be used in a secure manner since MobileSUITE delivers them in encrypted form and decrypts them only at the time of execution in the secure application execution infrastructure. There is no need to register such HTML applications in an “app store”—they can be delivered by simply registering them on the MobileSUITE management screen on the Web.

In short, using these application/content management functions enables a system manager to quickly deliver content and HTML applications. The user, meanwhile, only has to log onto the mobile portal on the terminal to gain access to many types of content and updated HTML applications previously registered by the system manager.

In addition, content and HTML applications can be downloaded beforehand onto the mobile portal so that they can be used in an offline state regardless of location.

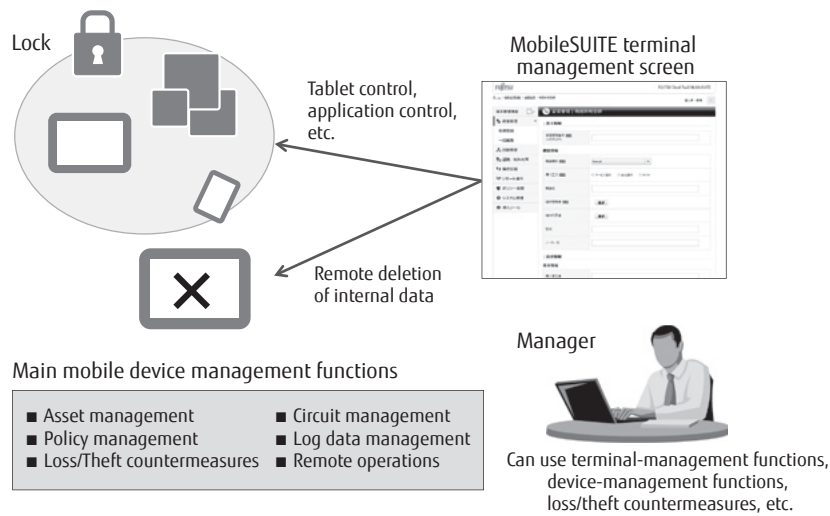


Figure 4
Mobile device management functions.

4.2 Mobile device management functions

Measures for handling the loss or theft of a smart device used for business applications are indispensable. MobileSUITE provides MDM functions for managing and executing these measures, thereby simplifying the management of smart devices for system managers.

These management functions enable a system manager to manage the settings of a security policy applied to a user's terminal. Then, by checking the state of that terminal based on that policy, the system manager can determine whether the terminal is in a secure state. If not, the terminal can be set to inhibit logins and thereby prevent ID/password leaking. A user terminal can also be locked by a remote operation, and data on the terminal can be deleted if necessary to protect critical information. The terminal itself can also be reinitialized. A system manager can easily execute these operations from a Web system (**Figure 4**).

In addition, log data such as terminal-booting events can be checked from a management screen on the Web, enabling efficient operations to counter the risk of information leaks.

4.3 Future outlook

As described above, a key feature of MobileSUITE is the provision of basic functions required by users of smart devices as a service.

Of course, to take full advantage of MobileSUITE, an enterprise must use it as a platform for developing HTML applications on its own and for linking those applications to its own business systems. This approach will make it possible to achieve an ideal work style using smart devices.

At Fujitsu, we are continually enhancing MobileSUITE functions to make them even easier to use for application developers, system managers, and users. For example, we support user authentication through the use of near field communication (NFC) and are providing new services such as linking with business systems by voice (MobileSUITE Voice Operation).⁴⁾

Furthermore, we are focusing our development efforts on improving the graphical user interface (GUI) to make operations more efficient for system managers and on improving response times for user operations to raise the quality of services. MobileSUITE is the optimal service platform for driving a renaissance in work style using smart devices.

5. Conclusion

This paper described the FUJITSU Software Interstage Mobile Application Server middleware product, which supports the efficient development and operation of applications for smart devices, and the FUJITSU Cloud PaaS MobileSUITE service platform, which is provided as a cloud service to support the immediate

use of functions for content delivery and digital catalogs and the management of mobile devices.

Gartner Inc., the American information technology advisory firm, predicts that more than 50% of applications for smart devices will be hybrid by 2016.⁵⁾ Fujitsu is focusing on hybrid applications that make use of Web technologies and know-how such as HTML5 and JavaScript. Going forward, we will continue to develop products oriented to smart devices to assist our customers in growing their businesses.

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