FUJITSU Software
Interstage AR Processing Server V1.0

Overview

Preface

Purpose of this document

This document provides an overview of Interstage AR Processing Server.

Intended readers

This document is intended for users who want an overview of Interstage AR Processing Server. Readers of this document are also assumed to have knowledge of:

- Smart devices

- Operating system that will be used with this product

Structure of this document

This document is structured as follows:

Chapter 1 Introduction

Provides an overview of Interstage AR Processing Server, and describes its advantages, features, management workflow, etc.

Chapter 2 Operating environment

Describes the operating environment of Interstage AR Processing Server.

Chapter 3 System configuration

Describes the system configuration of Interstage AR Processing Server.

Glossary

Explains the terms used in this document.

Abbreviations

This manual uses the following abbreviations for the operating systems:

Official name	Abbreviation	
Microsoft Windows Server 2012 Foundation	Windows Server 2012	Windows
Microsoft Windows Server 2012 Standard		
Microsoft Windows Server 2012 Datacenter		
Microsoft Windows Server 2008 R2 Standard	Windows Server 2008 R2	
Microsoft Windows Server 2008 R2 Enterprise		
Microsoft Windows Server 2008 R2 Datacenter		
Microsoft Windows Server 2008 R2 Foundation		
Red Hat Enterprise Linux 6 (for Intel64)	Linux	

Notations

In this manual, text that must be replaced by the user is denoted in *italicsWithMixedCase* (for example, *installDir*).

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Contents

Chapter 1 Introduction

This chapter provides an overview of Interstage AR Processing Server and describes its advantages, features, workflow, etc.

1.1 Outline

Interstage AR Processing Server is an AR integrated platform product that utilizes AR (Augmented Reality) to transform on-site operations.

By simply pointing the camera of a smart device towards an AR marker, it is possible to perform tasks such as overlaying the information required by the user on real objects, or adding information such as measurement data or information acquired by operators using simple operations in the field. This product achieves accurate recognition by using Fujitsu's own AR markers, which work under a range of lighting, distance and steadiness conditions, to withstand use in the field.

1.1.1 Overlay

Interstage AR Processing Server uses AR markers to identify positions and targets, and display overlay information (hereafter referred to as "overlay") on top of real objects.

Figure 1.1 Example of an overlay
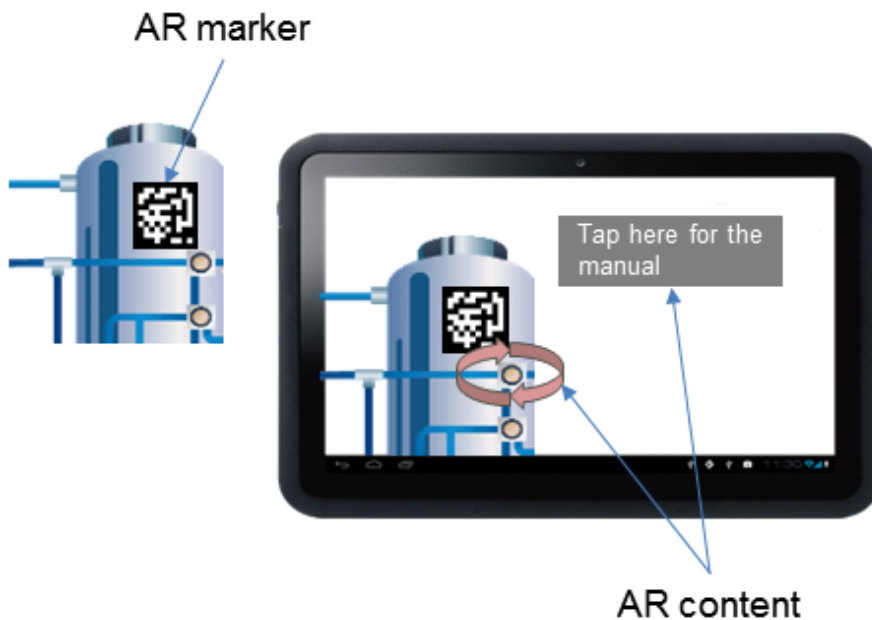
AR marker

    Interstage AR Processing Server identifies AR marker IDs and the positioning of AR markers and smart devices, and displays overlays by using the camera to recognize images called AR markers. An AR marker is composed of the marker body, which is enclosed by a black frame and white margin.

AR content

    AR content (images, text and other content) is overlaid on real objects when a smart device is pointed towards an AR marker.

1.1.2 Scenarios, scenes and AR overlay definitions

In Interstage AR Processing Server, scenarios and scenes are used for managing AR overlay definitions in order to display overlays according to the work content or situation.

- Scenario
Consists of multiple scenes (or "steps"). Using a presentation tool as an example, a scenario would be a single file comprising multiple slides.

Example of scenarios

- The content of daytime and nighttime inspections is different, even within the same facility

    - Scenario 1: Daytime inspection

    - Scenario 2: Nighttime inspection

- The information to be shown for each job is different, even within the same facility

    - Scenario 1: Operation

    - Scenario 2: Parts replacement

- Scene
  Group of AR overlay definitions displayed in the same context. Using a presentation tool as an example, a scene would be a single slide.

Example of scenes used in a plumbing parts replacement operation:

    - Scene 1: Checking the sensor information and verifying that the water has stopped running

    - Scene 2: Opening the cover

    - Scene 3: Replacing parts

- AR overlay definition
  Information related to AR markers for displaying overlays. Definition information such as which AR overlay content is displayed for which AR marker, the size and rotation of display, and for which scenario and scene.

Example of AR overlay definitions used in a plumbing parts replacement operation:

    - AR overlay definition 1: Displays sensor information at the specified coordinates of the AR marker with ID1

Figure 1.2 Example of the relationship between scenarios, scenes and AR overlay definitions
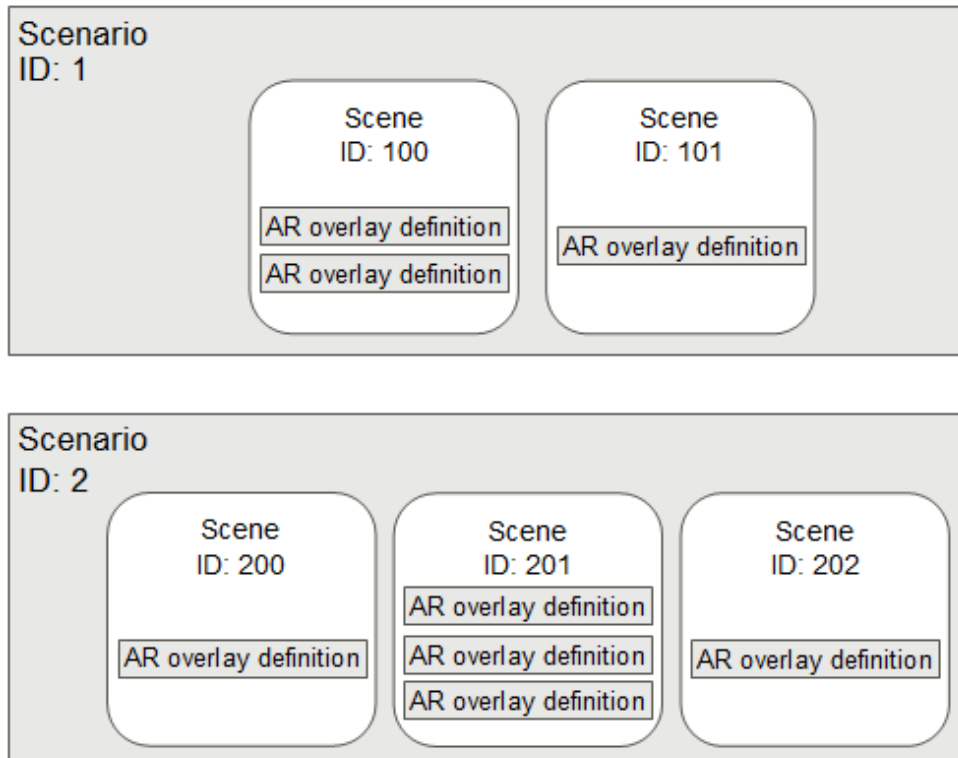
Point

- IDs are allocated for scenarios and scenes.

- The transition order between scenes should be implemented in applications according to operation content.

1.1.3 Applications

If using Interstage AR Processing Server, the following applications must be developed as required.

Figure 1.3 Application
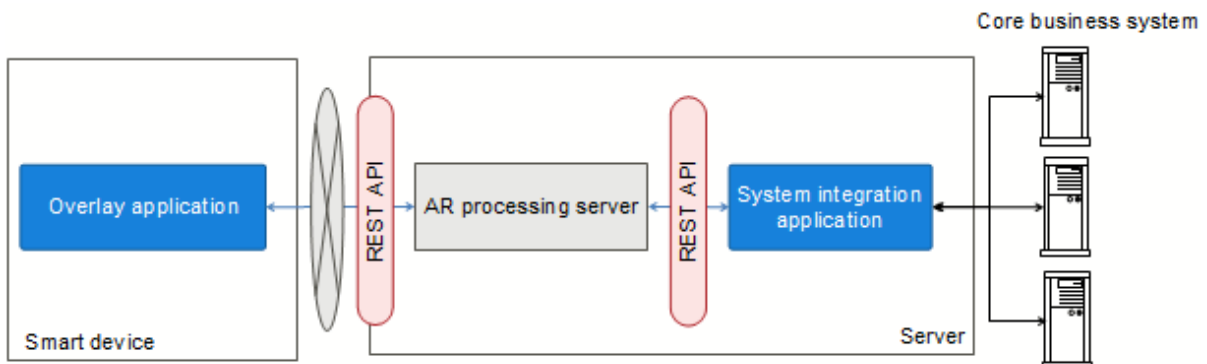
Overlay application

An application that uses AR technology to overlay content on images captured by the camera on smart devices such as smartphones and tablets. Overlay applications run on smart devices.

Overlay applications comprise native applications (which run on smart devices) and web applications. Implementing business logic in a web application enables the application to be coded independently of the device.

Figure 1.4 Overlay application
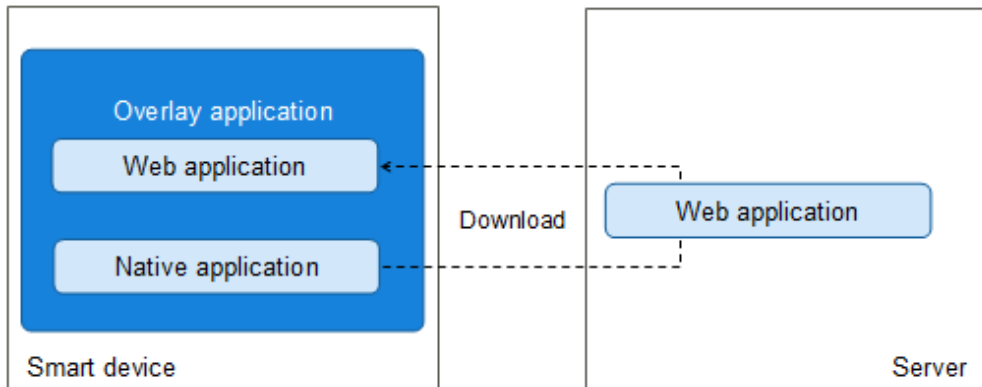
- Web application (web development languages such as HTML and JavaScript libraries)
  An application developed using web development languages such as HTML and JavaScript libraries. These applications are downloaded from the server to a smart device and run on the native application of the smart device.

- Native application (smart device development language such as Android)
  An application developed using development languages supplied by operating systems or accompanying SDK such as Android, and that runs on smart devices. These applications run natively on the smart device's operating system.

System integration application

A development application that performs overlaying of back-end data on front-end smart devices, and reflects data entered into a front-end smart device to the back-end system, by integrating with existing systems such as core business systems built in a back office. System integration applications run on servers.

1.2 Advantages

This section explains the main advantages provided by Interstage AR Processing Server.

1.2.1 High recognition accuracy, allowing markers to be used under a variety of sub-optimal conditions

Interstage AR Processing Server identifies assets by recognizing AR marker images.

Fujitsu's own AR markers (patent pending) are employed to achieve recognition accuracy that withstands use in the field, even at sites located outdoors or in dark places, by working under a range of lighting, distance and steadiness conditions.

Interstage AR Processing Server is equipped with an error correction feature that prevents recognition errors even in cases such as wash out that can occur when used in direct sunlight.

1.2.2 Acquisition of the most appropriate information when pointing a smart device, according to the situation

Pointing a smart device towards an AR marker enables acquisition of situation-based content such as the work content or procedure, based on information such as AR marker IDs acquired through image recognition. For example, manuals are displayed for maintenance personnel and the measurement data input fields are displayed for inspection personnel, enabling them to use information depending on the site situation.

The displayed content can change according to the work or user, even for the same AR marker, by managing displayed content or business information centrally on the server. Moreover, the required information can be acquired even when the work site is offline, by caching the content on the smart device.
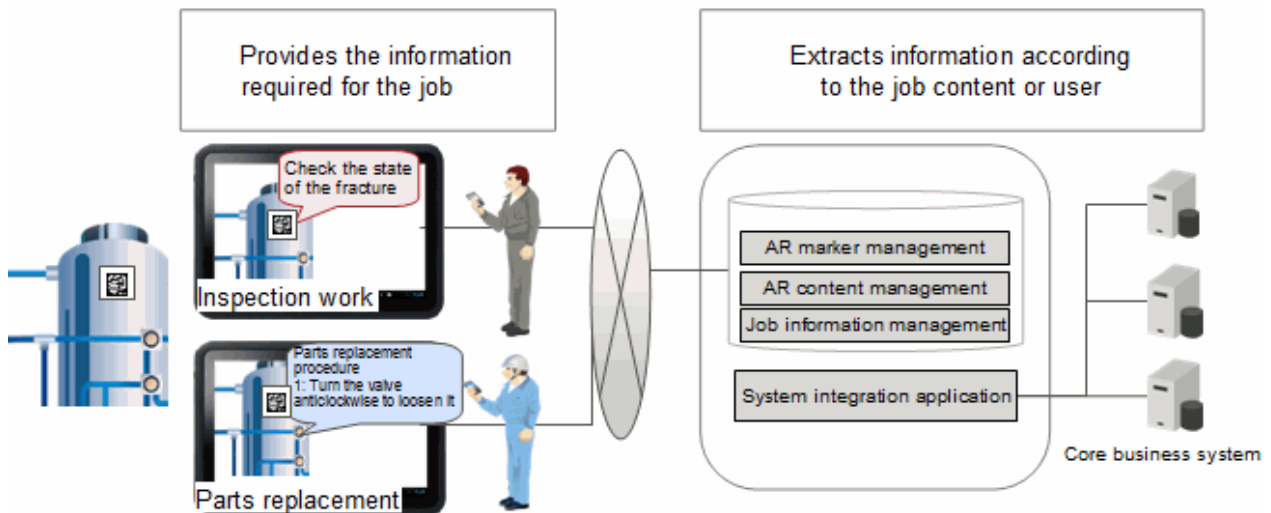
1.2.3 Intuitive operation and easy AR content creation through smart authoring

Text, handwritten memos, drawings, photos and data such as information acquired on-site and notes can be linked to AR markers and registered as AR content. Sharing information from the field is aimed at preventing human error and achieving more stable quality. Anyone can easily create AR content, by aligning with the position of images captured by the camera on a smartphone or tablet, using intuitive operations such as dragging and pinching in/out.

AR content can also be displayed in an offline environment by caching it in the smart device. Moreover, managing AR content on a server enables the displayed content to change according to work content or user.
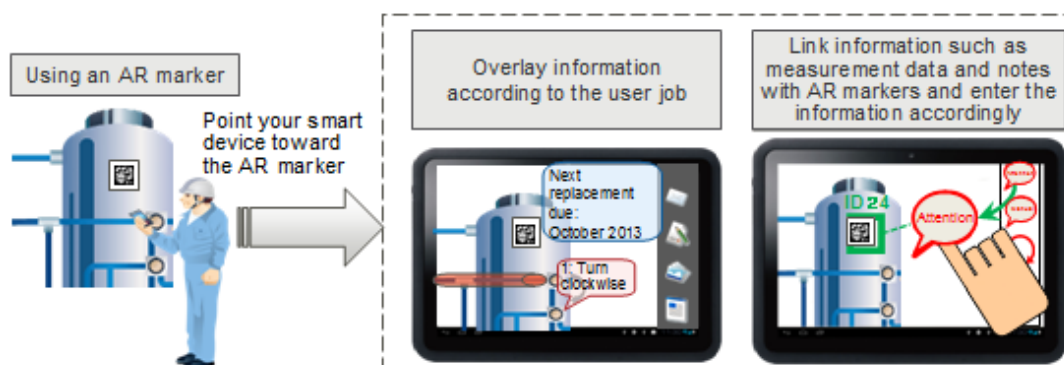
1.3 Features

This section explains the main features provided by Interstage AR Processing Server.

1.3.1 AR markers and AR content overlaying

AR content is overlaid on real objects when the smart device camera detects an AR marker.

Modify the AR content based on the location information so that the content appears as an overlay for the user.

Step 1:
Turn this valve clockwise

The following information is obtained through marker recognition:
- AR marker ID
- Relative positioning of the smart device and AR marker

Analyzes the marker pattern and acquires the AR marker ID

Determines the relative positioning based on the size and degree of distortion of the frame

Recognizing AR markers

AR marker with a specific graphic pattern on images captured by the camera on a smart device or tablet is recognized, and the position of the smart device relative to the AR marker is measured.

Overlaying AR content

AR content is overlaid at a suitable position on camera images based on AR overlay definitions and the measured position. Multiple AR overlay definitions can be linked to a single AR marker, and overlays can be displayed simultaneously for multiple AR markers captured by the camera.

Displaying AR content in 2D/3D

The overlay is displayed in 2D mode (whereby AR content is always displayed at the same angle and size regardless of the orientation of the marker), or 3D mode (whereby the AR content appears to be affixed to a particular location). In 2D mode, this feature enables text information for procedures or other document to be read from any angle without being distorted, and in 3D mode, it enables navigation elements (such as arrows) to be displayed accurately, regardless of the angle they are viewed from.

Using images such as arrows

2D display
3D display

When viewed from directly in front

2D display
3D display

When viewed from an angle

In 3D display, because the information is attached to the real object, it is easy to understand instructions such as which direction to turn the object.

Using text

3D display
2D display

In 2D display, the information is undistorted, and therefore is easy to read, regardless of the where the smart device is pointed from.

Fujitsu's AR markers

Interstage AR Processing Server employs Fujitsu's own AR markers, to enable recognition even from long distances and in dark or dirty environments for carrying out tasks such as maintenance and inspections. Moreover, this product achieves recognition accuracy that can withstand use in the field. The size of AR markers can be adjusted to match the marker affixing location.

1.3.2 Management of AR content according to the situation

Information related to AR markers, AR content and jobs is centrally managed in the server. This feature facilitates presentation of situation-based content, such as work content, operating conditions and history.

Management of AR markers

The physical location and usage state of AR markers provided by Interstage AR Processing Server can be managed in the server. AR marker images can also be downloaded.

Scenario and scene control

The overlay content (scenario and scene) can be changed even for the same AR marker, depending on the situation - for example, the overlay content may differ according to the user.

Tap action

Interstage AR Processing Server provides a tap action feature that can retrieve a file or call a method if specific AR content is tapped. For example, after an overlay is performed, it is possible to perform actions such as displaying a manual by tapping AR content as needed.

Management of operation information linked to AR markers

Information required for operations can be linked to AR markers and managed accordingly.

1.3.3 Server connection mode and standalone mode

Because AR can be used even in locations where there is no communication environment such as a public line or wireless LAN, it is possible to switch between server connection mode and standalone mode according to the network environment. In server connection mode, communication and synchronization with the server is performed online, and data is saved on the smart device side. In standalone mode, data saved to the smart device can be used.
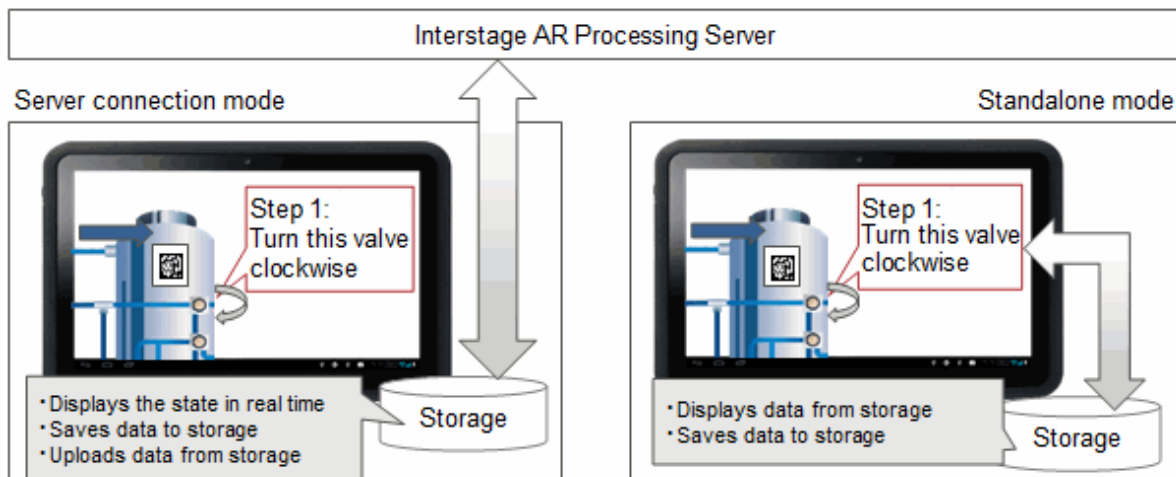
1.3.4 AR content creation

The user can create, either on the server or on the smart device, content definitions that specify what kind of information is displayed, where, and in which scenario, in which scene, and for what AR marker.

Server authoring using a data management console

Authoring can be performed in a browser using a data management console.

Client authoring using a client authoring tool

Authoring can be performed in a smart device using a client authoring tool.

1.3.5 Resources provided for application developers

Interstage AR Processing Server provides features necessary for the development of overlay applications that use AR technology, and system integration applications that integrate with existing systems, such as core business systems.

Overlay applications include web applications (which are developed using web development languages such as HTML and JavaScript libraries), and native applications (which are developed using smart device development languages).

Overlay application

Overlay applications include web applications (which are developed using web development languages such as HTML and JavaScript libraries), and native applications (which are developed using smart device development languages).

The following features, required for developing overlay applications that run on smart devices and that display information received from the server, are provided (refer to the *Developer's Guide* for details):

- JavaScript library

- REST API

- Development project (Eclipse project files, Xcode project files)

- Sample application (web application)

System integration application

The following feature for managing context (registering, updating, getting or removing AR overlay definitions, etc.), required for building business applications that integrate with external data of the core business, for example, is provided:

- REST API

1.4 Configuration of Interstage AR Processing Server

This section explains the basic configuration of Interstage AR Processing Server.

Figure 1.5 Basic configuration of Interstage AR Processing Server
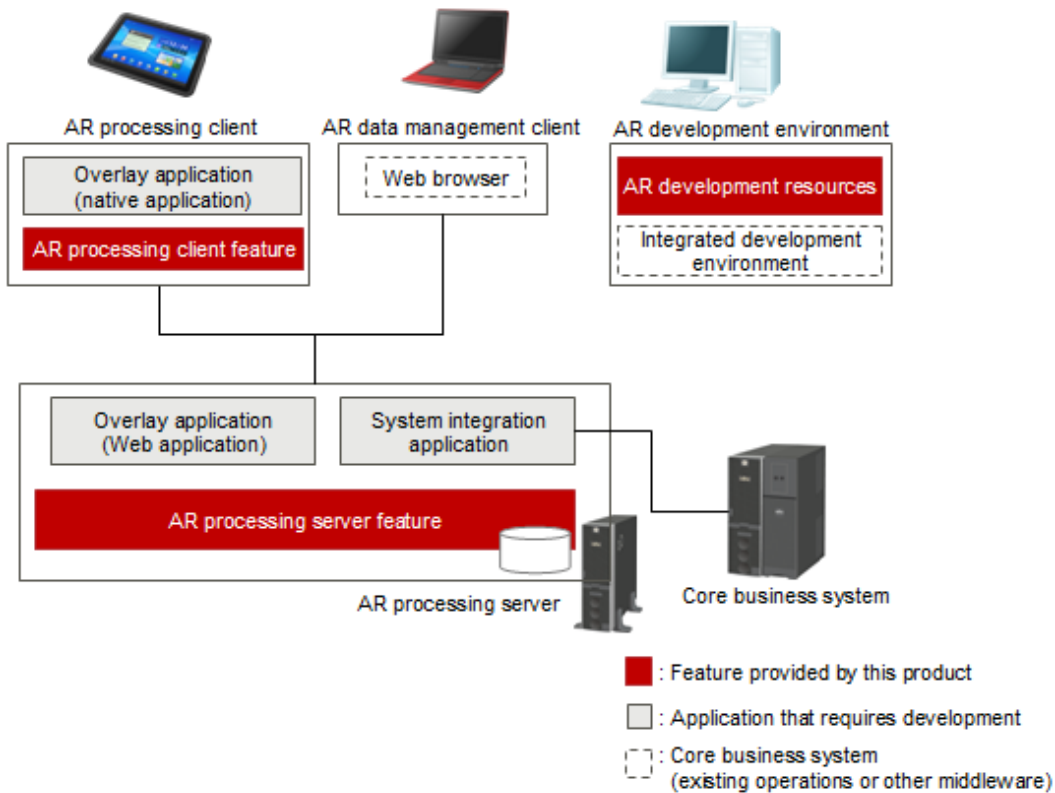
AR processing client

    AR software that runs on smart devices, performing image recognition for AR markers, AR overlay content display, communication with the server, data cache management and log management.

AR processing server

    Performs tasks such as centralized management of ICT information related to AR markers and superimposed on real-world information, and running REST API. AR processing servers also manage the system operation of Interstage AR Processing Server, such as starting and stopping an AR processing server, deploying applications and backing up data.

AR development environment

    An environment for developing applications, using AR development resources supplied to system developers.

AR data management client

    Performs data management tasks for Interstage AR Processing Server, such as downloading AR markers, creating scenarios and managing AR content.

1.5 Workflow

This section describes the workflow for Interstage AR Processing Server.

1.5.1 AR data management (including server authoring)

This section describes the workflow for management of AR markers, scenarios and scenes from an AR data management client, and for server authoring. The data management console is accessed from a browser on the AR data management client, and information is stored on the server running Interstage AR Processing Server.

The basic workflow for AR data management is as follows:

1. Log in to the data management console.

2. Change the state of the desired AR marker to "Used".

3. Create scenarios and scenes according to the requirements.

4. Register files that are to be used for AR overlay content and tap actions to the server.

5. Use server authoring to create AR overlay definitions.

Figure 1.6 Example of basic workflow for AR data management
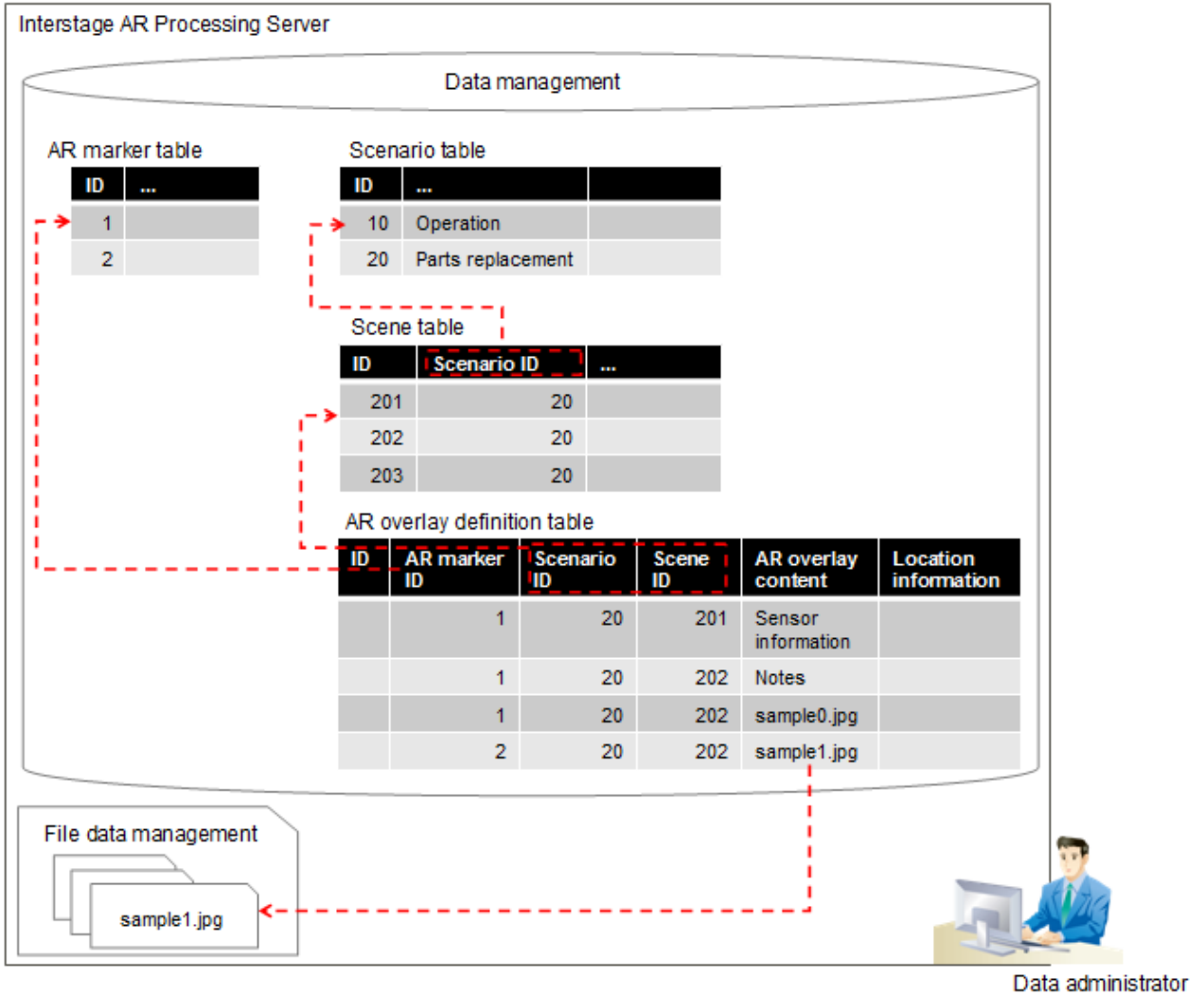
Data management

Manages information for AR markers, scenarios, scenes, and AR overlay definitions.

AR marker table

Table for managing AR marker information (such as AR marker state and location) on the server running Interstage AR Processing Server.

Example

Table 1.1 Example of an AR marker table

AR marker ID	State	Location	...
1	Used	Building A, Floor 2, Room 201	
2	Used	Building A, Floor 2, Room 201	

AR marker ID	State	Location	...
3	Unused		

Scenario table

Table for managing scenario information (such as scenario ID and name, and registration datetime) on the server running Interstage AR Processing Server.

📋 Example

Table 1.2 Example of a scenario table

Scenario ID	Scenario name	...
10	Operation	
20	Parts replacement	

Scene table

Table for managing scene information (such as scene ID and name, parent scenario ID, and registration datetime) on the server running Interstage AR Processing Server.

📋 Example

Table 1.3 Example of a scene table

Scene ID	Scenario ID	Scene name	...
201	20	Parts replacement procedure 1	
202	20	Parts replacement procedure 2	

AR overlay definition table

Table that stores overlay definition information (such as AR marker ID, scenario ID, scene ID, content and deployment information).

📋 Example

Table 1.4 Example of an AR overlay definition table

ID	AR marker ID	Scenario ID	Scene ID	AR overlay content	Location information
1	1	20	201	"Sensor information"	
2	1	20	202	"Note"	
3	1	20	202	"sample0.jpg"	
4	2	20	202	"sample1.jpg"	

File data management

Manages data that cannot be stored in the database (such as image files used in AR overlay content).

1.5.2 Client authoring

This section describes the workflow for client authoring. In client authoring, AR overlay definitions can be created intuitively for the selected scene.

The basic workflow for client authoring is as follows:

1. Launch the client authoring tool on a smart device, and acquire the scenario list and scene list that have been defined.

2. From the list, select the scenarios and scenes to add content to.

3. Download the data for the selected scenes from the server.

4. Point the smart device toward an AR marker and define information such as text and images for the selected AR marker.

5. Save the defined content, and upload it to the server.

Figure 1.7 Example of a basic workflow for client authoring
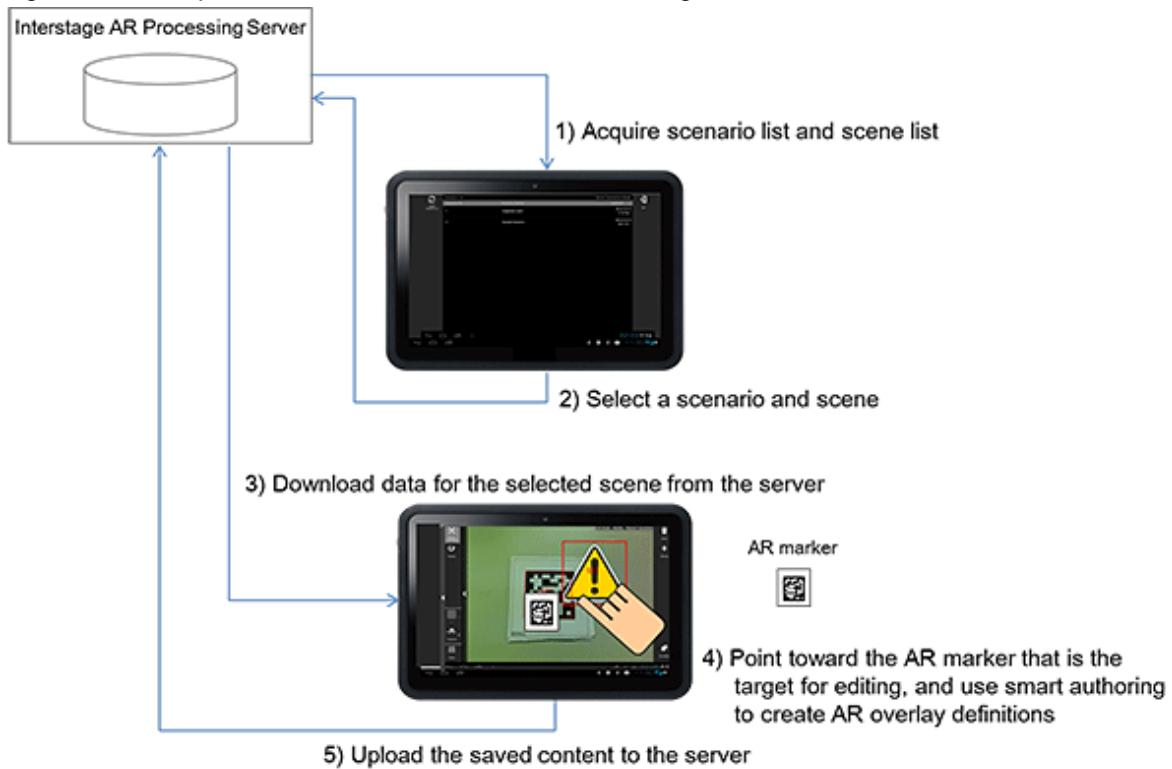
Point

- It is necessary to perform AR marker management and create scenarios and scenes from the AR data management client prior to performing client authoring.

- AR overlay definitions defined using server authoring can be edited via client authoring.

Chapter 2 Operating environment

This chapter provides information about the operating environment of Interstage AR Processing Server.

2.1 AR processing server

This section provides information about the operating environment of AR processing servers that Interstage AR Processing Server runs on.

2.1.1 Hardware environment

This section lists the hardware resources required for Interstage AR Processing Server.

Recommended hardware resources

Hardware type	Conditions
CPU	- Minimum: Intel(R) Xeon(R) Processor 2 GHz, 2 cores, 2 or more CPUs - Recommended: Intel(R) Xeon(R) Processor 3 GHz, 4 cores, 2 or more CPUs
Memory capacity (not including the operating system)	- Minimum: 3 GB or higher - Recommended: 4 GB or higher

Static disk capacity

The disk capacity required for installation is as follows.

Table 2.1 Windows

Installation directory	Disk capacity required for installation
Interstage AR Processing Server installation folder	300 MB
System drive	150 MB
Total	450 MB

Table 2.2 Linux

Installation directory	Disk capacity required for installation
/opt	342 MB
/etc/opt	1 MB
/var/opt	197 MB
Total	540 MB

Dynamic disk capacity

The following disk capacity is required over and above the static disk capacity when running Interstage AR Processing Server.

Table 2.3 Windows

Item	Installation directory	Required disk capacity
Data management	*installFolder*\fjsvpgs_data	$numberOfRecords$ x 0.01 MB + (100 MB) (*1) *1: Required for marker table
File data management	*installFolder*\arsvfdm_data	$avgFileSize$ x $maxNumberOfFiles$ + 1 GB

Table 2.4 Linux

Item	Installation directory	Required disk capacity
Data management	/var/opt/FJSVar/fjsvpgs_data	$numberOfRecords$ x 0.01 MB + (100 MB) (*1)
		*1: Required for marker table
File data management	/var/opt/FJSVar/arsvfdm_data	$avgFileSize$ x $maxNumberOfFiles$ + 1 GB

📘 Example

....

- Example calculation of disk capacity required for data

    - Scenarios: 10, with 100 scenes per scenario, 30 AR overlay content items per scene
      10 scenarios x 100 scenes x 30 overlay definitions = 30,000 records,
      30,000 records x 0.01 MB = approximately 300 MB, therefore,
      Total: 300 MB + 100 MB = 400 MB

    - Scenarios: 10, with 100 scenes per scenario, 100 overlay definitions per scene
      10 scenarios x 100 scenes x 100 overlay definitions = 100,000 records,
      100,000 records x 0.01 MB = approximately 1GB, therefore,
      Total: 1 GB + 100 MB = 1.1GB

- Example calculation of disk capacity required for the file system

    - If the file average size = 1 MB,
      1 MB x 500 files = 1.5 GB

....

📙 Note

....

Files cannot be added or updated if the available disk capacity is less than 1 GB for the partition containing the specified file system. Ensure to secure sufficient capacity.

....

2.1.2 Software environment

This section lists the software resources required for Interstage AR Processing Server.

Operating systems

One of the following operating systems is required if using the AR server feature:

- Microsoft Windows Server 2012 Datacenter

- Microsoft Windows Server 2012 Standard

- Microsoft Windows Server 2012 Foundation

- Microsoft Windows Server 2008 R2 Datacenter

- Microsoft Windows Server 2008 R2 Standard

- Microsoft Windows Server 2008 R2 Enterprise

- Microsoft Windows Server 2008 R2 Foundation

- Red Hat Enterprise Linux 6 (for Intel64)

📙 Note

....

Interstage AR Processing Server does not support the Server Core feature.

....

Required software

The required software depends on the system configuration for Interstage AR Processing Server. Refer to "Chapter 3 System configuration" for details.

For small-scale entry models used in an intranet environment:

The following software is required if using Basic authentication settings or issuing SSL server certificates:

- Interstage Web Server Express V11

For small-scale entry models used in an Internet environment:

- Interstage Web Server Express V11

- Load balancer

For medium- to large-scale, high reliability, high availability models used in an intranet environment:

- Interstage Application Server V11

- Symfoware Server Standard Edition V12

- Load balancer

For medium- to large-scale, high reliability, high availability models used in an Internet environment:

- Interstage Web Server Express V11

- Interstage Application Server V11

- Symfoware Server Standard Edition V12

- Load balancer

Conflicting software

There is no software that conflicts with Interstage AR Processing Server.

Required packages

The following packages are required if using Linux.

Package	Architecture
compat-libtermcap	x86_64
compat-readline5	x86_64
ncurses-libs	x86_64
nss-softokn-freebl	x86_64
redhat-lsb	x86_64
zlib	x86_64

2.2 AR processing client

This section provides information about the operating environment of smart devices that run an AR processing client.

2.2.1 Hardware environment

This section lists the hardware resources required for smart devices that are to be used with Interstage AR Processing Server.

Recommended hardware resources

The recommended hardware resources for smart devices that are to be used with Interstage AR Processing Server are as follows:

Hardware type	Conditions

Memory capacity	- RAM
	    Minimum: 512 MB, Recommended: 2 GB
	
	- ROM
	    Minimum: 8 GB, Recommended: 64 GB

Camera	Out-camera

Memory capacity

If performing high load overlays such as using a large volume of image files at once, the memory capacity on the smart device may be insufficient, resulting in the image displaying white. Therefore, ensure to use the following formula to calculate the required memory capacity according to the job content.

Calculation for RAM

Use the following formula to calculate the required memory capacity for the RAM:

$ramInBytes = (verticalSizeOfImgResourcesInScene$ x $avgHorizontalSize)$ x 4 x $numberOfImages$

📝 Example
....

If 100 1024 x 1024 [pixel] images are set as AR overlay definitions per scene:
Required memory = 1024 x 1024 x 4 x 100 = 400 MB
....

Calculation for ROM

Use the following formula to calculate the required memory capacity for the ROM to be used in one scenario:

$romUsedForOneSceneInMb = avgResourceFileSizeInMb$ x $numberOfFilesInScene$

$romUsedForOneScenarioInMb = avgRomUsedForOneSceneInMb$ x $numberOfScenesInOneScenario$

Camera

We recommend smart devices equipped with out-cameras.

Supported smart devices

The list of supported smart devices will be updated progressively. Refer to the Fujitsu Technology Solutions Partner Extranet and External Collaboration for details:
https://partners.ts.fujitsu.com/

Disk capacity

The disk capacity required for business applications depends on the job content.

2.2.2 Software environment

This section lists the software resources required for smart devices that are to be used with Interstage AR Processing Server.

Operating systems

One of the following operating systems is required when using Interstage AR Processing Server:

- Android

- iOS

📓 Note
....

The list of supported operating systems will be updated progressively. Refer to the Fujitsu Technology Solutions Partner Extranet and External Collaboration for details:
https://partners.ts.fujitsu.com/
....

Required software

There is no required software for Interstage AR Processing Server.

Conflicting software

There is no software that conflicts with Interstage AR Processing Server.

2.3 AR development environment

This section provides information about the operating environment for the AR development environment that is to be used for developing applications that run on Interstage AR Processing Server.

2.3.1 Hardware environment

This section lists the hardware resources required for the AR development environment.

Table 2.5 Recommended hardware resources

Hardware type	Conditions
CPU	Recommended: Intel(R) Pentium III 1 GHz or higher
Memory capacity (not including the operating system)	Minimum: 512 MB, Recommended: 2 GB or more

 Note
. . . .
When developing applications using an Android emulator, you must test them in a smart device, since Android emulators do not support testing.
. . . .

2.3.2 Software environment

This section lists the software resources required for the AR development environment.

Operating systems

One of the following operating systems is required:

- Windows(R) 8

- Windows(R) 8 Pro

- Windows(R) 8 Enterprise

- Windows(R) 7 Home Premium

- Windows(R) 7 Professional

- Windows(R) 7 Enterprise

- Windows(R) 7 Ultimate

- OS X

Required software

The following software is required for developing native applications:

- Android

- Android SDK

- Eclipse IDE

- JDK 6

- Android Development Tools (ADT) plug-in

- iOS

    - Xcode

Conflicting software

There is no software that conflicts with Interstage AR Processing Server.

2.4 AR data management client

This section provides information about the operating environment for the AR data management client, which manages data for Interstage AR Processing Server.

2.4.1 Hardware environment

This section lists the hardware resources required for the AR development environment.

Table 2.6 Recommended hardware resources

Hardware type	Conditions
CPU	Recommended: Intel(R) Pentium III 1 GHz or higher
Memory capacity (not including the operating system)	Minimum: 512 MB, Recommended: 2 GB or more

2.4.2 Software environment

This section lists the software resources required.

Operating systems

One of the following operating systems is required:

- Windows(R) 8

- Windows(R) 8 Pro

- Windows(R) 8 Enterprise

- Windows(R) 7 Home Premium

- Windows(R) 7 Professional

- Windows(R) 7 Enterprise

- Windows(R) 7 Ultimate

- OS X

Required software

- Windows(R) Internet Explorer(R) 10

- Windows(R) Internet Explorer(R) 9

Conflicting software

There is no software that conflicts with Interstage AR Processing Server.

Chapter 3 System configuration

This chapter describes the system configuration for Interstage AR Processing Server. Select a suitable model according to the operating environment and scale. For non-Interstage AR Processing Server products, build the environment as necessary.

3.1 Items for consideration

The following are the main items that need to be considered before installing the system:

- Scope for system users

- Network environment

- Wi-Fi settings for smart devices

- Continuous operating time for smart devices

- Resource size design

3.1.1 Scope for system users

It is necessary to decide on factors such as the number of system users, and the types and number of smart devices to be used for jobs that are to be automated using Interstage AR Processing Server.

3.1.2 Network environment

Interstage AR Processing Server manages information centrally. This requires communication between the server and the smart devices. Regarding the network environment, the following items need to be considered in advance:

- Network environment in the field where smart devices are used

- Available smart device capacity for downloading content from the server

- Timing of server data downloads

- Security between the server and smart devices

3.1.3 Wi-Fi settings for smart devices

In Android versions, the operating system specifications do not allow AR processing clients to access the network environment that needs to be connected via a proxy server, even if a proxy server is specified in the Wi-Fi settings. In iOS versions on the other hand, AR processing clients can access the required network environment via a proxy server, because the Wi-Fi settings are reflected in the smart device.

3.1.4 Continuous operating time for smart devices

Applications that use Interstage AR Processing Server operate and communicate through the camera. This may result in smart devices having a shorter continuous operating time than that envisaged by smart device manufacturers, even if using a fully charged smart device.

3.1.5 Resource size design

Due to the significant time it takes to download large resource files (PDF, video, etc.) from the server when using server data in server connection mode, it is recommended to perform operations using local data on smart devices, such as using local data in standalone mode or server connection mode.

## 3.2 Example configuration patterns

Factors such as the operating environment, the number of simultaneous connections by users, the volume of context that is handled, and security, are to be taken into consideration when deciding the required configuration. Interstage AR Processing Server supports the following server configurations:

- Model A: Small-scale entry model used in an intranet environment (all-in-one minimum configuration)

- Model B: Small-scale entry model used in an Internet environment (web servers deployed in DMZ)

- Model C: Medium- to large-scale, high reliability, high availability model used in an intranet environment (multiple-server configuration)

- Model D: Medium- to large-scale, high reliability, high availability model used in an Internet environment (in addition to above, web servers are deployed in DMZ)

3.2.1 Model A: Small-scale entry model used in an intranet environment

An all-in-one minimum configuration model with a single-server configuration. This configuration is envisaged for 50 or fewer simultaneously connected smart devices.

Figure 3.1 Example of a small-scale entry model used in an intranet environment
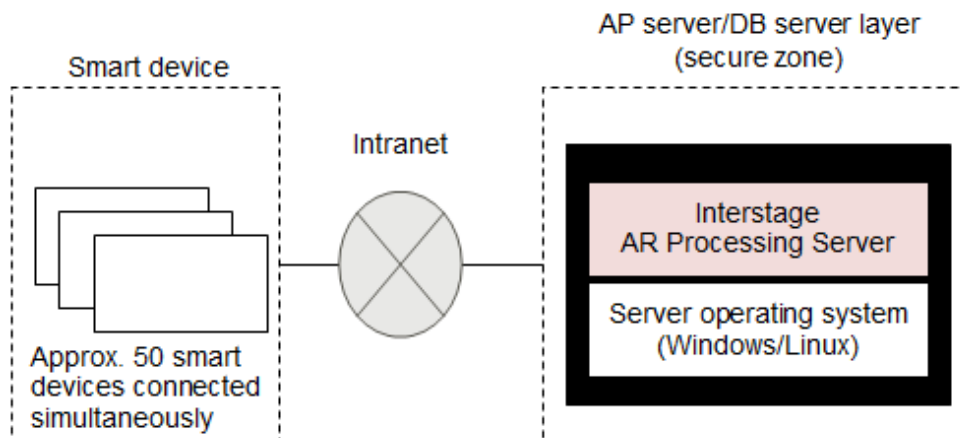
Note

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To perform basic authentication settings or issue SSL server certificates for model A, refer to the method described in the manual for Interstage Web Server Express when installing a web server (Interstage Web Server Express) in an intranet environment. Interstage Web Server Express can be installed on the server running Interstage AR Processing Server or on other servers.

. . . .

3.2.2 Model B: Small-scale entry model used in an Internet environment

This configuration is used for downloading overlay applications or using the AR data management console via a web server deployed in DMZ. This configuration is envisaged for use in standard operation. To maintain security, use measures such as basic authentication, SSL encryption, and IPCOM, to protect the IT system from internal and external threats.

This configuration is envisaged for 50 or fewer simultaneously connected smart devices.

Figure 3.2 Example of a small-scale entry model used in an Internet environment
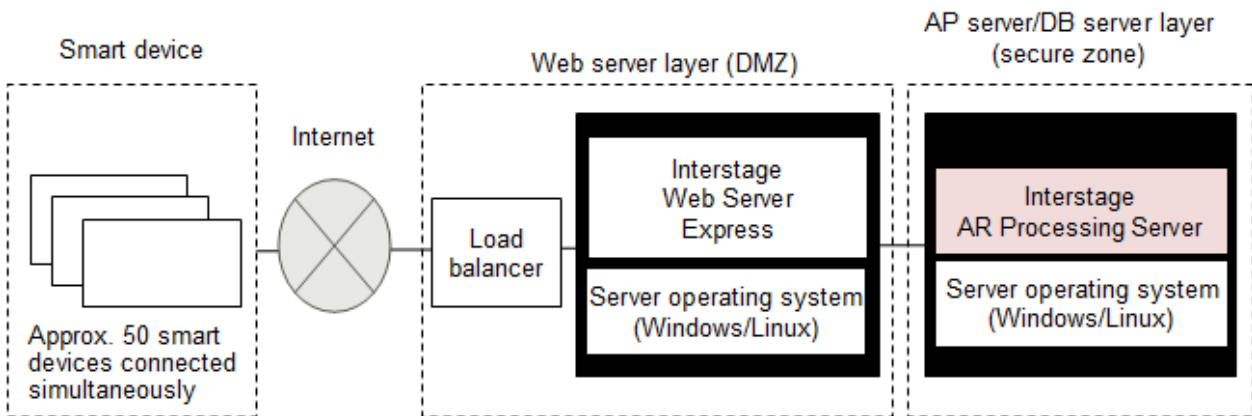

Note

Communication between the web server and AP server does not use SSL encryption, even when SSL encryption is enabled.

3.2.3 Model C: Medium- to large-scale, high reliability, high availability model used in an intranet environment

This system configuration is used for realizing high security/scalability in intranet operations, advanced authentication/authorization and user/role management features. For more efficient operations, it is recommended to integrate with Interstage Application Server V11 (hereafter referred to as WebServer).

This configuration is envisaged for approximately 150 simultaneously connected smart devices.

Figure 3.3 Example of a medium- to large-scale, high reliability, high availability model used in an intranet environment
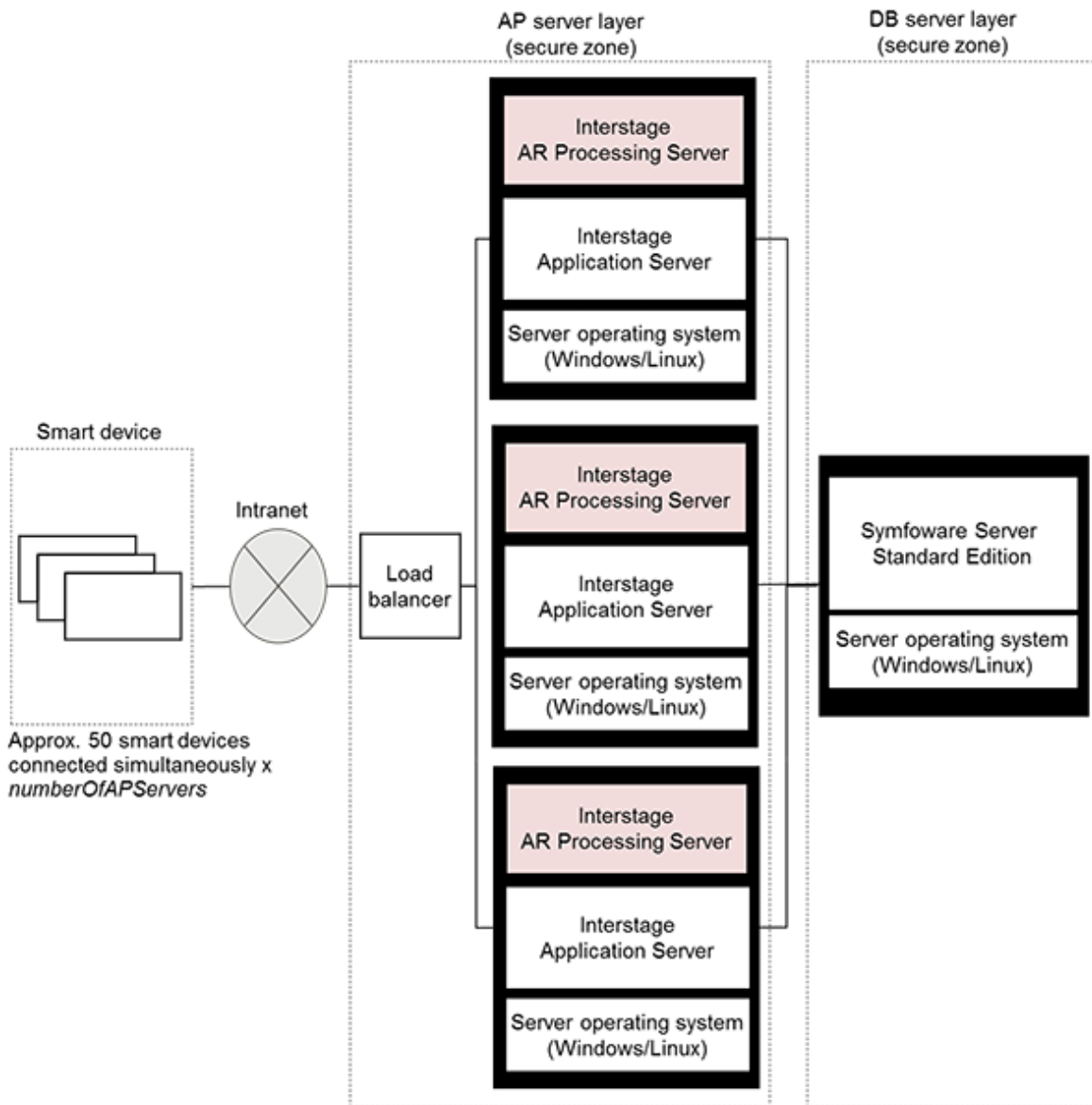

3.2.4 Model D: Medium- to large-scale, high reliability, high availability model used in an Internet environment

This system configuration is used for realizing high security/scalability in Internet operations, advanced authentication/authorization and user/role management features.

This configuration is envisaged for approximately 150 simultaneously connected smart devices.

Figure 3.4 Example of a medium- to large-scale, high reliability, high availability model used in an Internet environment
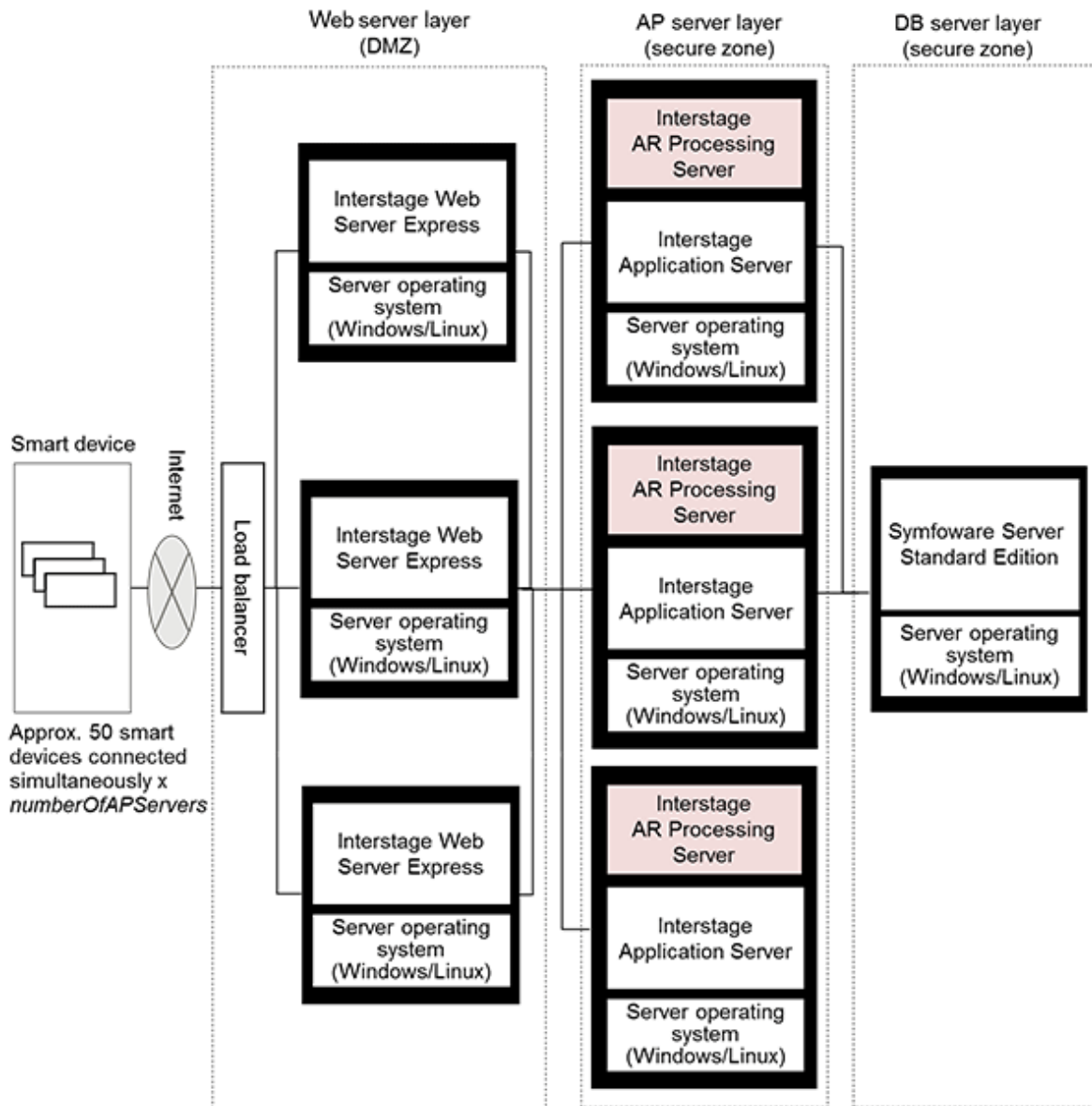
Glossary

AR (Augmented Reality)

AR is a technology that extends and enhances human awareness, by superimposing various digital information (such as characters, images and voice) on real-world information that humans obtain via sight and hearing.

AR data management client

Performs data management tasks for Interstage AR Processing Server, such as downloading AR markers, creating scenarios and managing AR content.

AR development environment

An environment for developing applications, using AR development resources supplied to system developers.

AR development resource

Resource supplied by Interstage AR Processing Server for the purpose of developing applications.

AR marker

Standard pattern images for displaying the AR content. AR markers are composed of a pattern image section surrounded by white space and a black margin

AR overlay content (AR content)

AR content (images, text and other content) superimposed on the image when a smart device is pointed towards an AR marker.

AR overlay definition

Information related to AR markers for displaying overlays. Definition information such as which AR overlay content is displayed for which AR marker, the size and rotation of display, and for which scenario and scene.

AR processing client

AR software that runs on smart devices, performing image recognition for AR markers, AR overlay content display, communication with the server, data cache management and log management.

AR processing server

Performs tasks such as centralized management of ICT information related to AR markers and superimposed on real-world information, and running REST API.

authoring

Creation of AR overlay definitions.

client authoring

Authoring in a smart device, using a client authoring tool.

data administrator

Manages data required for the Interstage AR Processing Server system.

data management console

A console provided by Interstage AR Processing Server for performing data management tasks, such as creating scenarios and scenes, downloading AR markers, and performing server authoring. It runs in a browser.

ID area

The area surrounding the AR marker that is set for entering information such as the ID, to enable system users or data administrators to identify AR markers.

image texture

A type of AR content.

native application

A type of AR overlay application that runs natively on the operating systems of smart devices.

native AR display layer

Displays AR content specified in the AR overlay definitions in an overlay application.

native camera display layer

Displays images acquired by an overlay application using a camera.

overlay (verb)

To superimpose content such as images or text on real-world objects in smart devices.

overlay application

An application that uses AR technology to overlay content on the camera preview screen of smart devices. It can be a native application or a web application.

polygon

One of the components of AR content. The shape of AR content (cube form) comprises polygons.

resource

One or more files used for tap actions and AR content stored in a location such as an AR processing server or other media cloud. Resources that use AR content are referred to as image textures.

scenario

A group of multiple scenes. Using a presentation tool as an example, a scenario would be a single file comprising multiple slides.

scene

A group of AR overlay definitions that are displayed in the same context. Using a presentation tool as an example, a scene would be a single slide.

server authoring

Authoring in a browser, using a data management console.

server connection mode

In the case of smart devices that are online, connections and synchronization with the server are performed online, and the data is saved on the smart device.

smart authoring

Creation of AR overlay definitions using intuitive operations. This is one type of smart technology that is being proposed by Fujitsu.

standalone mode

Enables use of an overlay application using data saved on a smart device.

system developer

Performs design, development and testing of applications that run in Interstage AR Processing Server.

system integration application

A development application that performs AR overlaying of back-end data on front-end smart devices, and reflects data entered into a front-end smart device to the back-end system, by integrating with existing systems such as core business systems built in a back office.

system operation administrator

Performs maintenance tasks, such as installation and setup of Interstage AR Processing Server, and starting or stopping the server.

system user

Uses business applications that run in Interstage AR Processing Server.

tap action

An action where AR content is tapped to perform actions such as passing resources to external applications or running scripts.

text texture

A type of AR content.

texture

One of the components of AR content. This information is pasted on to the face of a polygon. Content such as images and text can be pasted as texture.

web application

A type of AR overlay application used for development. It uses web languages such as HTML and JavaScript. This type of application is downloaded to smart devices from a server, and runs on native applications for smart devices.

web layer

Software that runs and displays web applications in overlay applications.