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6.55
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1. 8
2. 19
3. 21
4. Smartguard 24
5. 27
6. Application 28
7. Built-in Service Provider..... 43
8. Service Provider..... 45
9. Management Application Functions 47

1.

PC Server

가

가

1 Client/Server

[34] , Pentium

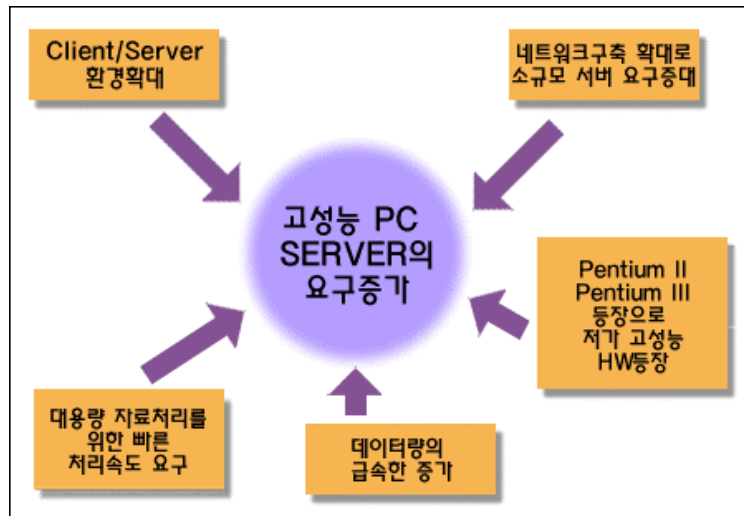
가

H/W

PC

Server

[1]



1. PC Server

TCP/IP [32]

[40]

LAN

가

PC Server

Workstation Vendor , LAN Protocol Mini Computer , Vendor

Corresponding Vendors , DECnet (Digital Equipment Corporation) [41], IPX (Novell) [42], SNA (IBM) [42]and XNS (Xerox corporation) [42]

Network Tool

System Vendor Vendor Protocol

TCP/IP [32] OSI (Open System Interconnect) [26] Workstation TCP/IP Protocol 가

Internetworking

Web SNMP [2] , Desktop DMI [3, 4] Enterprise [6]

PC LAN

가

LAN

PC

,

LAN
, Web

PC

. 2

, 3

4

5

6

2.

Tool
Tool

2.1

(Reliability, Availability, Serviceability) , RAS
가 System Manager [27]

System Manager (Down Time)
가
. System Manager

H/W
High End Server

System Manager가

System Manager

. System Manager

2.1.1

System Manager

2.1.1.1

Call Management

Profile ,

가

(Call) .

Problem Management

(Trouble Ticketing) ,

, Response ,

, Escalation -

. Vendor (History) ,

Management System System Management System .

2.1.1.2

Backup & Restore , ,

. Tape Tape

, Overwrite, .

2.1.1.3

Log Data ,

가

Graphical 가

가 가 .

2.1.1.4

Policy Based . Set
& Forget Set On Sign On
ID, 가 Access가 가

2.1.1.5

가 , Trigger Event
가
Load Balancing
Event ,
Report & Spool 가 ,

2.1.1.6

, SW

, S/W , S/W
가 S/W
DB DB , DB &
, Transaction , Data File

1

[25].

	,
	,
	,
	,
SW	SW Up/ Down Load
DB	DB , ,
	,
Help Desk	HW, SW,
	,
,	HW, SW, , 가

1.

2.2

System Manager

System Manager

System Manager

Framework

DMTF

(Desktop Management Task Force) [4]가 DMI (Desktop Management

Interface) [3], CIM (Common Interface Model) [5] SPEC

WBEM (Web Based Enterprise Management) [6] SPEC

2.2.1 DMI (Desktop Management Interface)

DMI PC, Application

DMTF Intel IBM, Compaq, NCR, HP, CA

가 가 . 1996 DMI 2.0 Version

DMI Management Program System Component
V2.0

Vendor가, 가, DEC/RPC [7, 8],

ONE/RPC [7, 8] TI/RPC [7, 8] 가

(e.g CMIP [10], SNMP [2])

DMI 가 Module

MI (Management Interface) : MA (Management Application)

DMI

SP

(Service Provider) Interface .

SP (Service Provider) : MI CI , MI CI
 Data . MIF File .

CI (Component Interface) : Component
 get/set SP .

MIF (Management Information Format) File :
 Component MIF Format
 Text File .

2.2.2 SNMP

TCP/IP [28, 37] ICMP
 (Internet Control Message Protocol) [26] End-to-End
 . ICMP
 Host가
 가 가

1988 IAB (Internet Architecture Board)
 . 가 HEMS (High Level Entity
 Management System) [12], SGMP (Simple Gateway Monitoring System) [13],
 CMIP/CMIS (Common Management Information Protocol/Services) [10]
 SGMP SNMP .
 HEMS 가 가
 , CMIP/CMIS .

SGMP NYSERNET SURAnet
 Proteon MERIT, IBM, MCI
 NFSNET
 IAB
 SNMP , IAB ISO CMIS/CMP NMS
 , SNMP IETF가 , HEMS
 MIB
 . SNMP 가
 V1.x
 Digital, HP V2.0

2.2.3 WBEM

WBEM (Web-Based Enterprise Management) [6, 35, 36]

. WBEM

. WBEM

WBEM Microsoft, Intel, Compaq, BMC, CISCO
 Standard Microsoft PDK (Product Development Kit)
 . WBEM Web User Interface System Manager
 System Manager
 , MDI SNMP

WBEM

Web-browser Device Application

SNMP [2] CMIP [10] DMI [3]

Device Application

(Unifying Management Schema)

WBEM

(UI)

(initiative)



가 가

WBEM

Management Service, Device Application 가 가

가

Internet Browser HTTP (Hyper Text Transfer Protocol) [14]

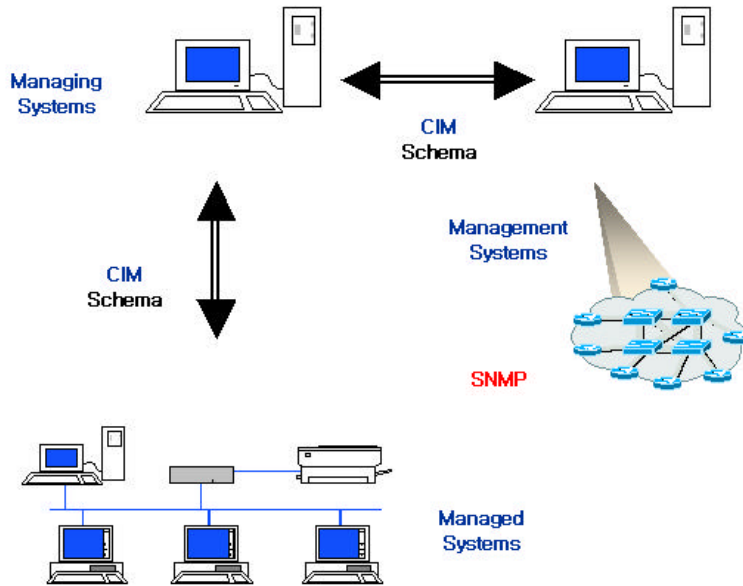
Management Service

Device Application SNMP, DMI

Device Application Data Management Service

Management Service Unifying Schema
Management Service

2 WBEM



2. WBEM Architecture

2.2.4 CIM

CIM (Common Information Model) Object-based Management Tool

	DMTF				
CMIP	Data Model	1997	4		CIM 1.0
SPEC [15]	. CIM				Computer Associates, HP,
IBM/Tivoli, Intel, Microsoft	CIM				WBEM PDK,
WMI (Window Management Interface : DMI					Implementation), WDM

(Window Device Model), MMC (Microsoft Management Console) NT5.0

CIM Core Model Common Model . Core Model
Common Model Core Model , Systems, Devices, Networks, Applications, Users, Service-Level Agreements

2.3 Windows NT

Windows NT [30] NT 1993
NT 4.0 , 2000 5.0
PC Server UNIX System

Windows NT 가

Windows NT 가 가 [16].

2.3.1 Windows NT

• : ,
, , ,
• : 가
(VPN), , QoS 가

● : CPU 가

● : , ,

● : MMC (Microsoft Management Console)

. WMI (Windows Management Infrastructure) DMTF CIM (Common Information Model) MSFT . WMI

2.3.1.1 WMI

Microsoft WMI (Windows Management Instrumentation) [45] WBEM , DMTF가 , WMI Microsoft Windows Windows Active Directory™ , Microsoft Management Console (MMC) , Windows Script Host (WSH)

WMI Microsoft Windows NT Windows 2000

WBEM 3

. Microsoft WMI

(CIM),

(COM/DCOM, 가), WMI

Win32® (DLL)

. WMI CIM

.

2.4

. 1980

(CIM: Computer Integrated

Manufacturing)

3

, 1 (), 2 (), 3 () .

1 DDC (Direct Digital Controller), PLC (Programmable Logic Controller)

, , , PID ,

, .

가

가

가

가

가

.

● Process I/O :

● Operator I/O : Panel, Monitor, Printer Man-Machine Interface

, 가

● :

● :

2.4.2

Platform PC

Windows NT

2.4.2.1

Maker

가 Maker

S/W

(H/W, S/W)

Network

PC

Interface

(Fieldbus, XML)

2.4.3

1

Windows NT

			/
Network	Pro-Com Network	TCP/IP	'95
	IP	IP , Sub Net	'97 /'00
			'01
Pro-Com	EIC HMI	PC, WinNT, InTouch	'96
	S/W	OpenVMS, C S/W	'98
	S/W	WinNT, Midas , C S/W	'99
	PC-based Pro-Com	PC, WinNT, TCP/IP, Midas , S/W	'99
PLC, DCS	PC-based	PC, WinNT, VLC, Profibus	'99

2.

2.4.4

PLC, PC

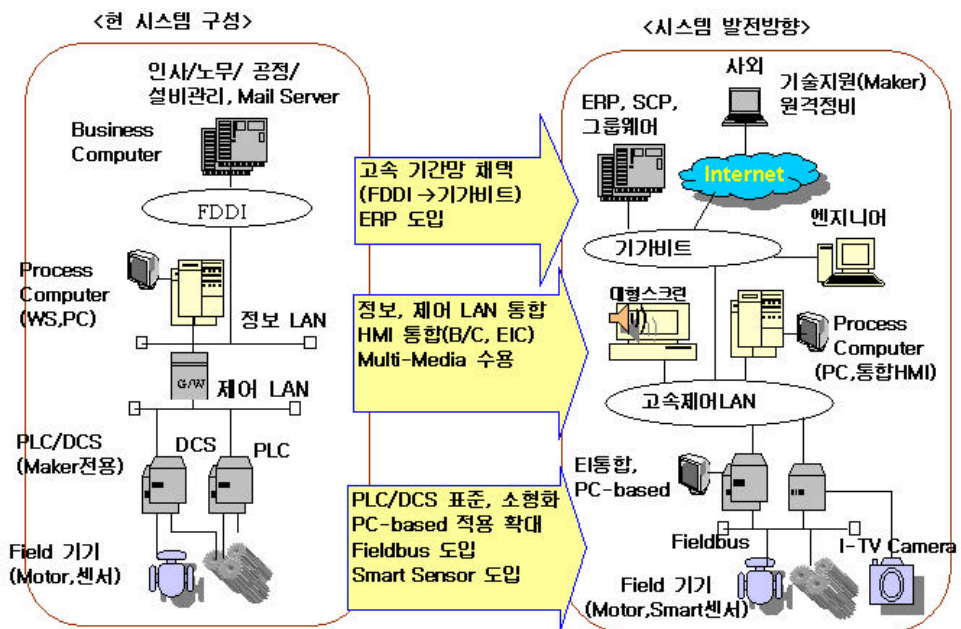
PC-based

PLC

, PLC

DCS , Window PC () Thin Client PC Server

[11] 3 . 3



3.

2.4.4.1

Platform

, PC

1

EIC , S/W

가

Pro-Com H/W, O/S	PC Server	Windows NT/2000	PC-based
	Alpha Server	Unix	
		OpenVMS	
PC-based	O/S	Windows NT/2000	2000.1 Entivity(Steeple chase)
	S/W	VLC(Visual Logic Controller)	
	Network	Ethernet, Profibus-DP	
		Data Network, Interface	
		DCS	
		WBEM Architecture	
EIC		EI (Hybrid)	
	Network	Ethernet, Profibus-DP	
	HMI	. HMI S/W Tool : InTouch(Wonderware), Citect(, Ci Technology) . FACOM Emulator: DCA IWW . O/S : Windows NT/2000 . H/W : Intel PC	'96.12 Citect : 가 PC
S/W	, UML S/W		

3.

2.5

UNIX NT
Customizing 가 SW

2.6

Point Framework
. Point
, Framework
/
가 . Point
BMC Partrol [17], NAS Center [18],
Ecoscope [19], [20]
Framework CA TNG [21], HP
Openview [22], IBM [23], Smartguard [24]
Framework , CA TNG
SW IBM, TANDEM, UNISYS, UNIX, NT
가 , TNG
. IBM
IBM
. HP Openview

, IBM, SUN, UNIX, NT

가 .

2.6.1 Smartguard

Smartguard [24]

- Smartguard
- Smartguard
- Message Box, E-Mail, Pager, Alarm, Log
- Remote Control가 , 가
- A/S Log File
- , Windows
- 가
- Overload
- CPU, Memory, HDD
- Reporting .

H/W		CPU, , UPS, FRU(Field Replaceable Unit), Network Device	
		, Voltage, FAN Speed	
	SMB	Server Management Board	
	UPS	, Charge Time, Status Monitor	
	NT	, Event Log, NT Service Information	
	UnixWare	, Job Scheduling, Configuration,	
Network Device		Device (vendor, Model), , H/W , Part Code, (Up/Down), Packet Error	

4. Smartguard

ESM (Enterprise System Manager) . SmartGuard가
 가 ESM H/W 가 SmartGuard
 ESM . ESM SmartGuard Console
 ESM ESM

Network Device

LAN

S/W

Management

SmartGuard

Network Device

, SMB

. SMB (Server Management Board)

A/S

가

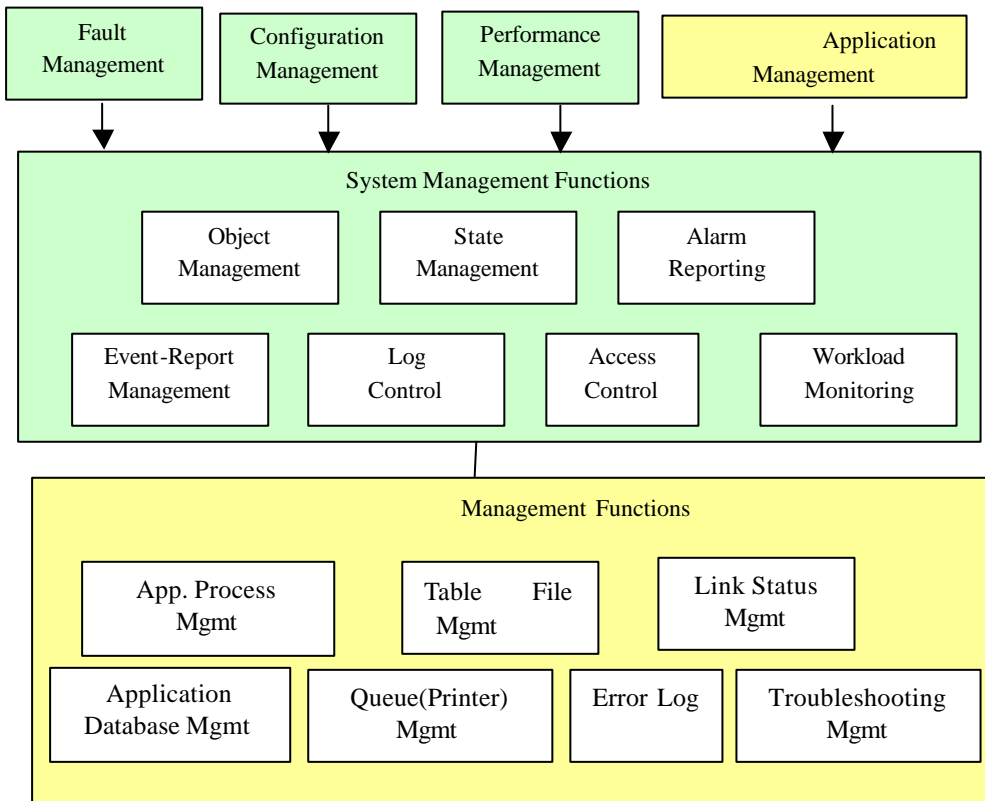
가

.

3.

2.1

3.1



4.

4

System Management Function

Management Function

.

4

5

2.1

가

Application

가

.

			(
)
			가
			가
			,

5.

App lication	Global Table File	Application Table File Global
	Link Status	PLC(Programmable Logic Controller), DCS(Distributed Control System), Client PC Display
	Application Database	DBMS Application /
	Queue(Printer)	Printer
	Error Log	.
	Troubleshooting	.

6. Application

4.

3

Module

4.1

WindowsNT Server Access Service
Provider (Built-in Provider)

SP (Service Provider) MA (Management Application) [33]

MA SP

Web

Console

SP MA

MI Module Component

CI Module,

MI CI

SP

Core Module

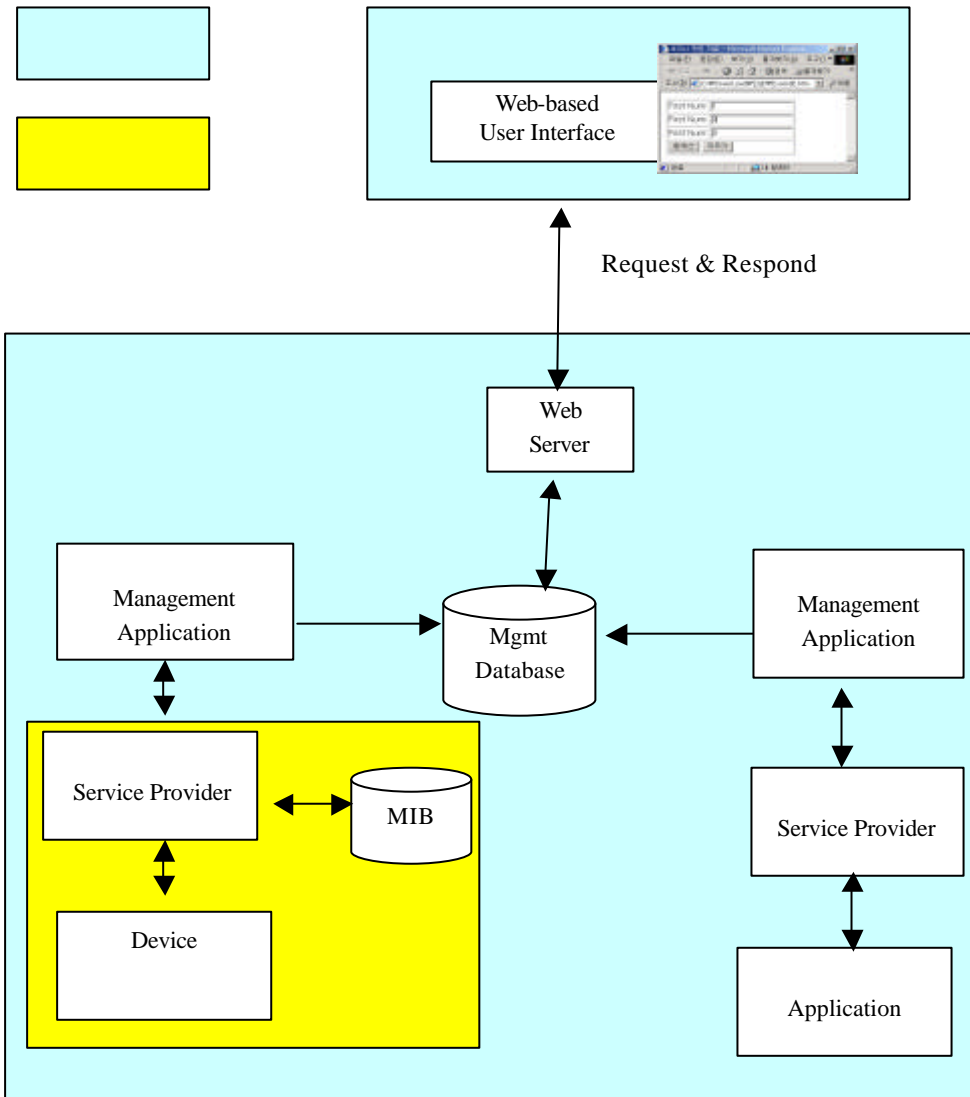
. Component SP

CI

CI

CI-Code

5



5.

4.2

Module SP (Service Provider) MA
(Management Application),

4.2.1 SP (Service Provider)
Service Provider

4.2.1.1
DMI 2.0 Spec Service Provider
Service
Provider

4.2.1.1.1 MI (Management Interface)

MI Service Provider Management Application
Management Application Entry Point
Management Application Service Provider API Service Provider
Entry Point Management Application Provider API

● Initialize Functions : MA SP 가
SP

● Listing Functions : MA SP Component가

Component Group Attribute
 가 . , SP
 Component List Group, Attribute List

- Operation Functions : Attribute 가
 , SNMP Get/Set

4.2.1.1.2 CI (Component Interface)

Service Provider Component Instrumentation Code Interface
 Component Instrumentation Entry Point
 Component Service Provider API Service Provider
 Entry Point Component Provider API .

- Initialize Functions : CI-Code (Component Instrumentation Code)
 SP 가 . SP CI-Code
 가 Component .

- Event Handling Functions : SP Component Event가
 , MA 가
 . , Event SP Database
 Log MA

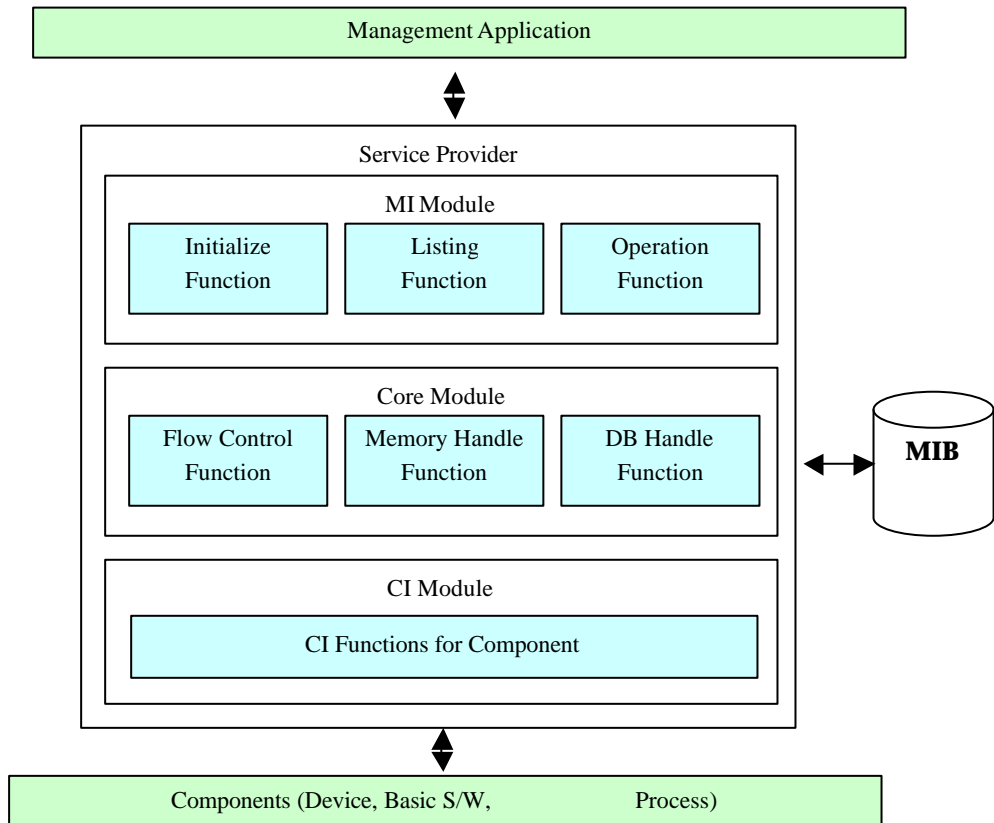
4.2.1.1.3 가

Management Application Component

Synchronization, Flow Control

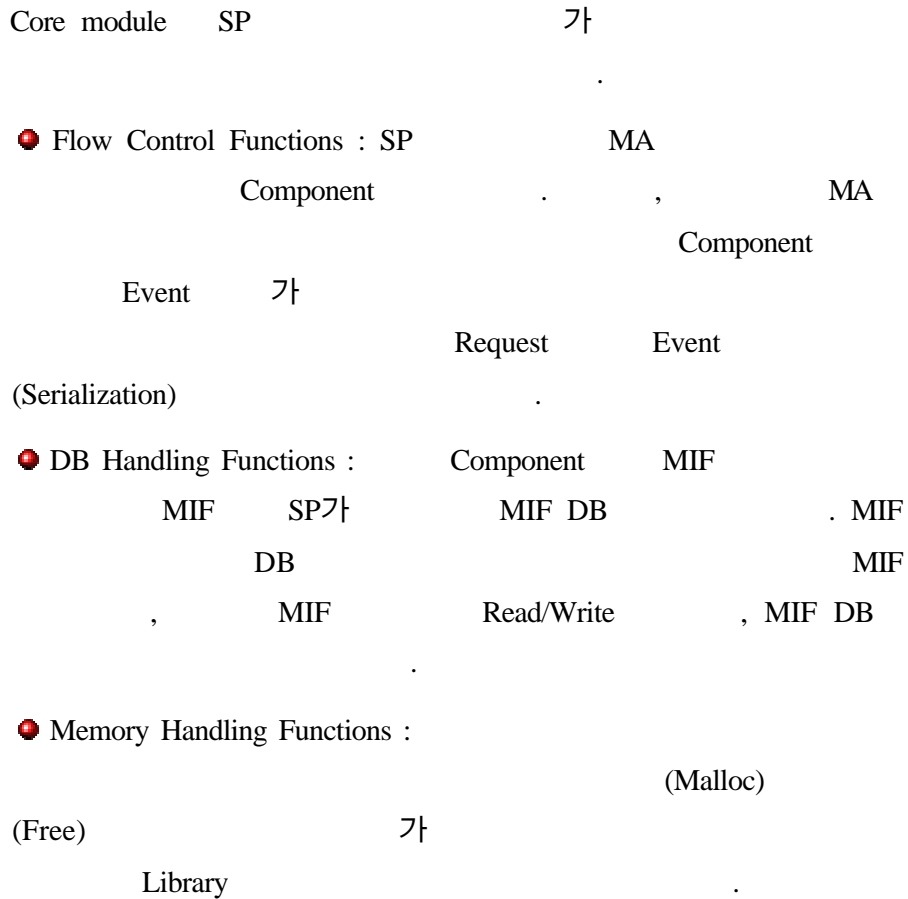
4.2.1.2 Service Provider

3 가 Module Core Module SP
(Flow Control, DB Handling, File
Handling) SP . MI Module MA
Interface , CI Module Device Interface
6 [33]

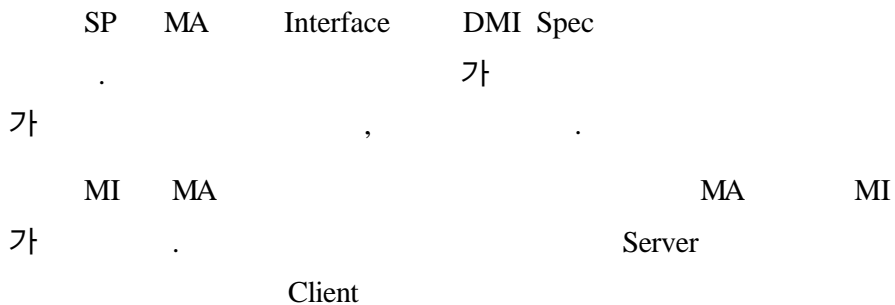


6. Service Provider

4.2.1.2.1 Core Module



4.2.1.2.2 MI Module



4.2.1.2.3 CI Module

SP	Component	Interface	DMI Spec
			Core Module
SP	CI	CI-Code	
CI-Code	SP가		CI

4.2.2 MA (Management Application)

Management Application

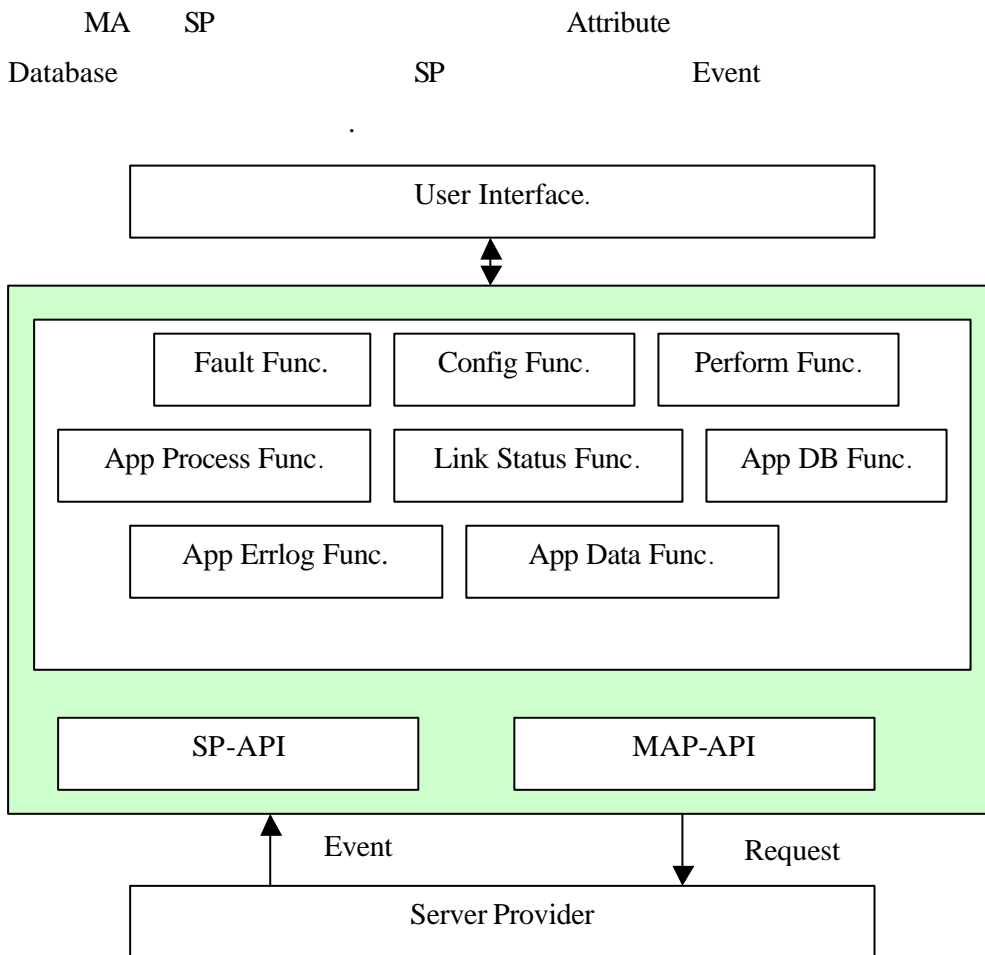
4.2.2.1

MA

- UIF (User Interface Functions) :
Grouping
- MAF (Management Application Functions) : UIF MAP-
API SP-API Function
SP-API , MAP-API Event
- SP-API (Service Provider API) : Service Provider
Service Provider API for Management Application
API
- MAP-API (Management Application Provider API) : Service
Provider Management Application Interface Service

● Application Data Management Function :

4.2.2.2 Management Application



7. Management Application

● MAF (Management Application Functions) : User Interface

SP-API

MAP-API

Event

Fault Management Function,

Configuration Management Function Performance Management

Function, Application Process

Management Function, Link Status Management Function, Application

Database Table Management Function, Application Error Log

Management Function Application Data Management Function

● MAP-API (Management Application Provider API) : Managed

Server

Event

Management

Application

Service Provider

● SP-API (Service Provider API) : Management Application

Managed Server System

Get/Set

Management Application Service Provider

Service Provider API for Management Application

4.2.3

Graphical User Interface (GUI)

MS-Windows



:

,

- : Global Table File
 , Link Status , Application DB , Queue , Error Log

- : ,
 , Process Down, SW Down, HW Error,

- : OS Version, CPU ,
 Memory , HDD , SW , Up Time,
 Process List, (,), Event
 Notification
 (, IP Address, CPU ,
 SW) , (,
 , Task) . 가
 (, , SW License) .

4.2.4 Database Table

Table .
 8 Table Schem
 . Table .

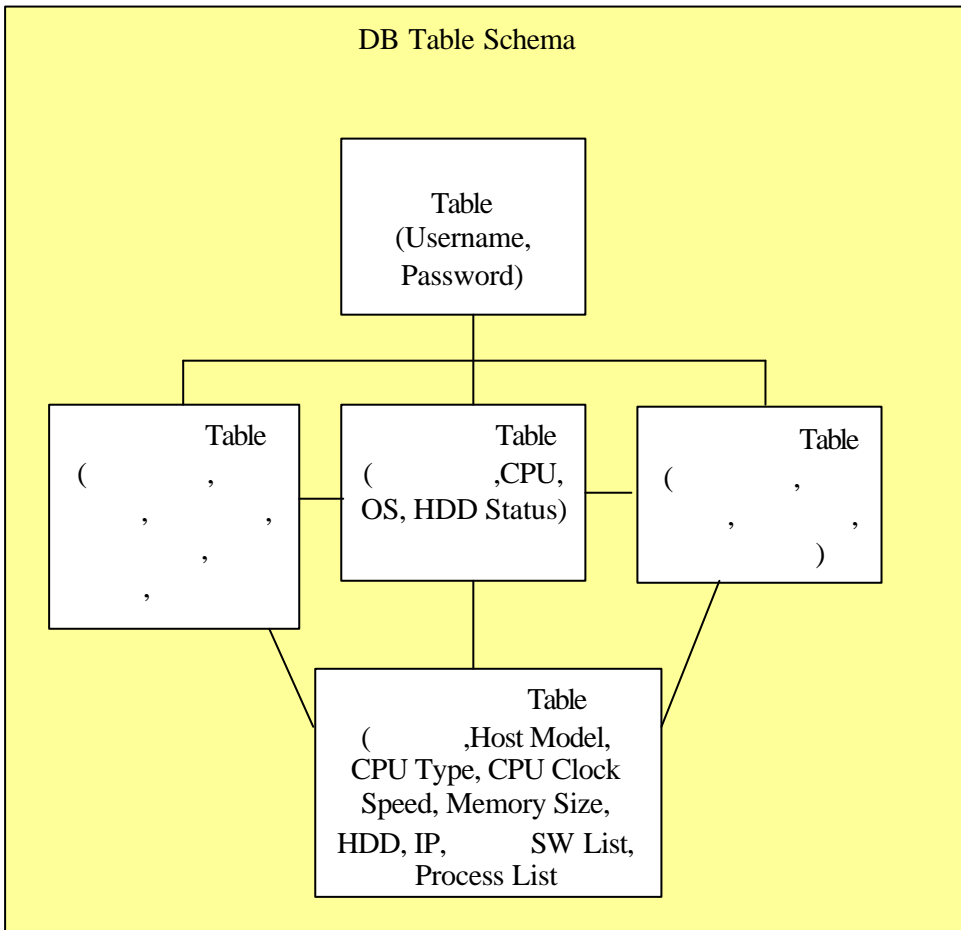
- Table :
 가

- Table :

● Table : CPU, Memory, Disk

● Table :
가

● Table :



8. DB Table Schema

5.

COM/DCOM [29] 가

가

Management Application Program

Back-End

Data

Service Provider

Database

5.1

Windows NT 4.0 Service Pack 5 ,

Windows 2000, WMI SDK (WMICORE.exe, WMISDK.exe) [38]가 ,

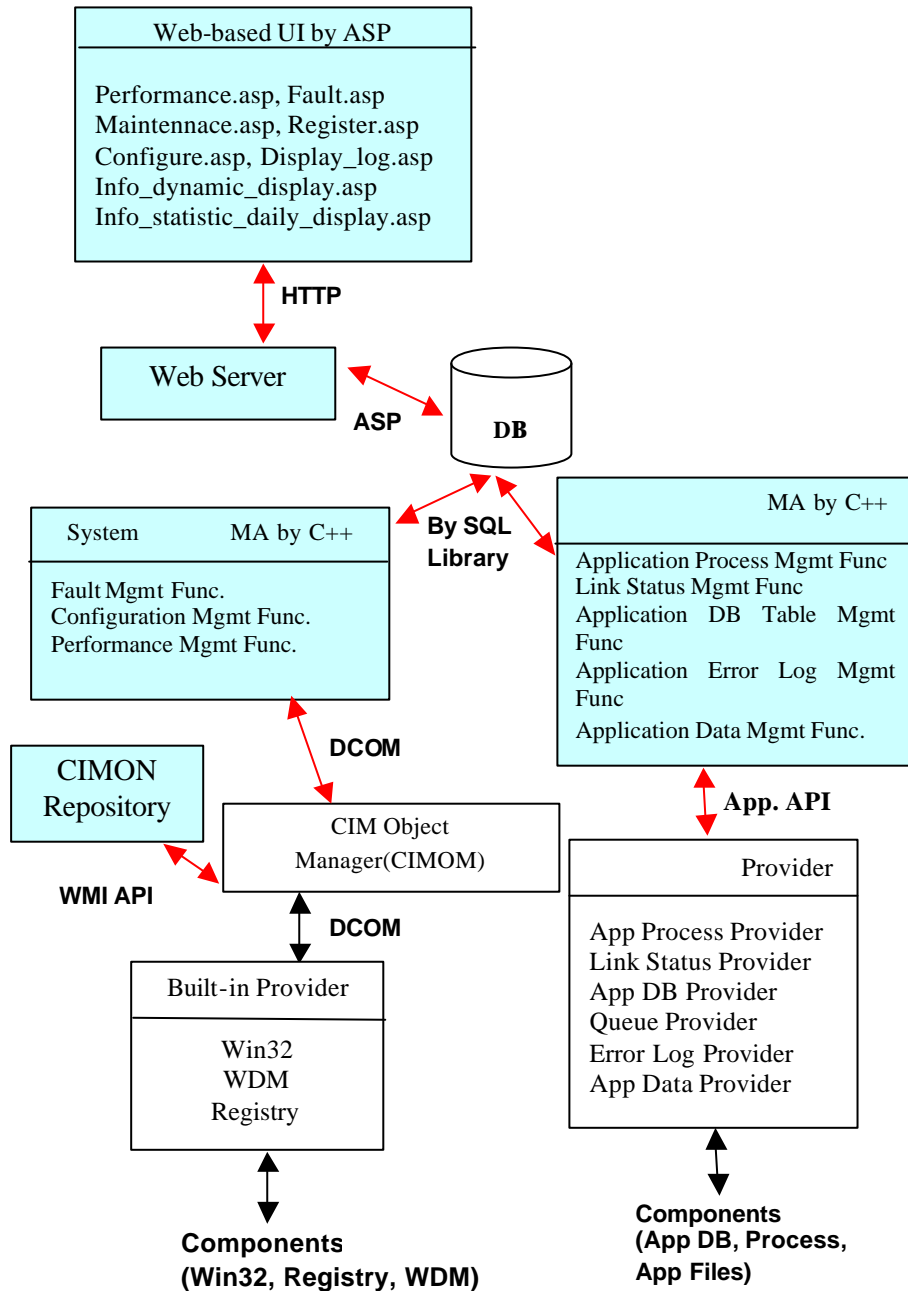
Visual C++ 6.0 Compilers [25]가 ,

Pentium-class Computer 32 MB RAM, 30

MB of Available Hard Disk Space .

9 Web User Interface, Management Application, Service

Provider Architecture .



9.

Architecture

5.2 Service Provider

Service Provider Built-in Service Provider
 Service Provider .

5.2.1 Built-in Service Provider

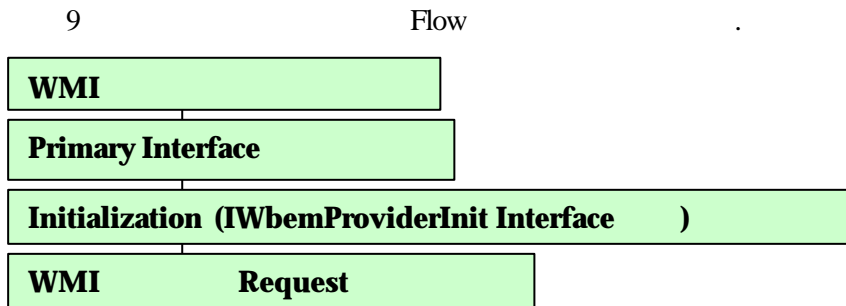
Windows NT WMI SDK Provider
 . 5 Built-in Service
 Provider . Built-in Service Provider .

Built-In Providers	
Directory Services Provider	Active Directory Class, Object .
Event Log Provider	NT Event Log Data Access
MS Windows Installer Provider	Windows Installer Access
Performance Counters Provider	Performance Counter Data Access
Performance Monitor Provider	NT Performance Monitor Data
Power Mgmt Event Provider	Event
Registry Event Provider	Registry Key, Value, Tree Event
Registry Provider	Registry Data Access
Security Provider	Security Settings Access
SNMP Provider	SNMP Devices Data Event Access .
View Provider	Source Classes, Computers Class .
WDM Provider	Device Driver Data Event Access
Win32 Provider	Win32 Subsystem Data Access

7. Built-in Service Provider

5.2.2 Built-in Service Provider Flow

WMI Provider Component Object Model (COM) distributed COM (DCOM) 가 WMI Provider Instance Provider . Instance Provider Instance Provider . Built-in Service Provider Service Provider WMI Provider . IwbemProviderInit Function Call 가 Built-in Provider Primary Interface . Primary Interface WMI IWbemServices Interface . IWbemProviderInit Interface . IWbemServices Interface Service Provider Management Application IWbemServices method Instance Method .



10. Built-in Service Provider Flow

5.2.3 Service Provider

Class	Service Provider	Class
6	Providers	
App Process Provider	Application File Access	Global Table
Link Status Provider	PLC(Programmable Logic Controller), DCS(Distributed Control System), Client PC Display Access	
App DB Provider	DBMS /	Application Access
Queue Provider		Printer Access
Error Log Provider		
App Data Provider		Access

8. Service Provider

5.2.4 Service Provider Flow

Service Provider
 Management Application, Component
 Management Interface
 Component Interface
 Main 가

5.3 Management Application

Management Application Flow

5.3.1 Management Application

Management Application Class

Class

7

System Application	Management	Fault Management Function Configuration Management Function Performance Management Function
Application	Management	Application Process Management Function Link Status Management Function Application Database Table Management Function Application Error Log Management Function Application Data Management Function

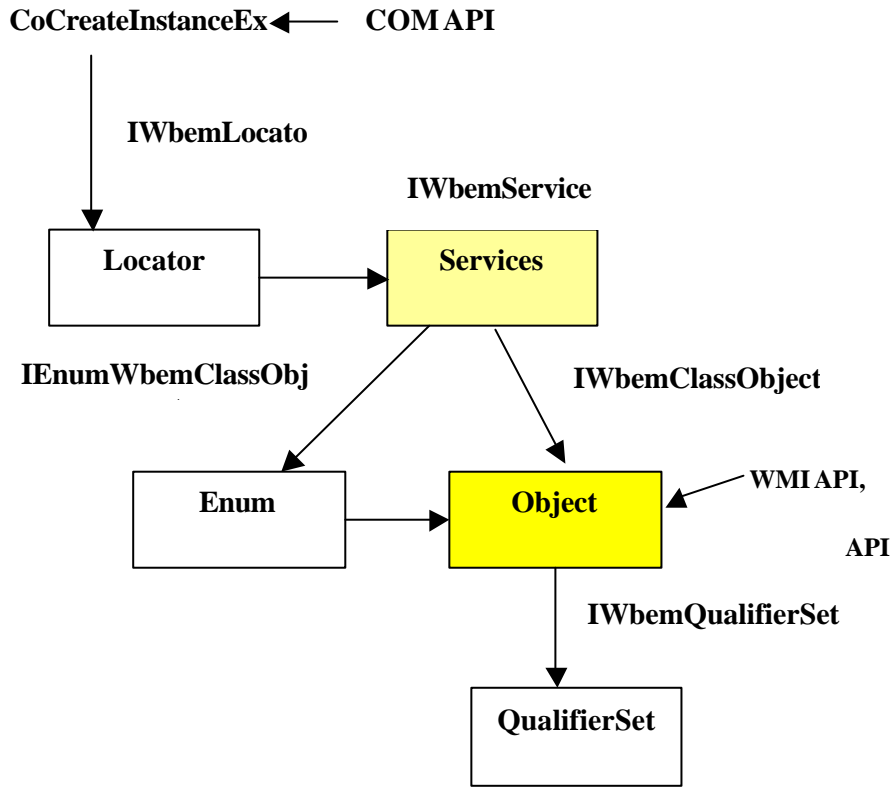
9. Management Application Functions

5.3.2 Management Application Flow

Management Application Management
Application Main Module

Management Application WMI API
COM COM Function
CoInitializeEx CoInitializeSecurity
Application Process COM COM Function
CoCreateInstance Instance

12 Management Application COM
 API Instance (Locator),
 Service (Services), (Object)



13. Management Application Flow

5.4 Web-based User Interface

	Table	Client	
Database		Script	Client
		.	Script
Microsoft		ASP (Active Server Page) [9]	.

5.4.1 Login :

가

	User Interface	.	12
User Interface		.	



14. User Interface

5.4.2 Main and Menu

Web User Interface



15. User Interface

5.4.3

14

User Interface

가



16. User Interface

5.4.4

가

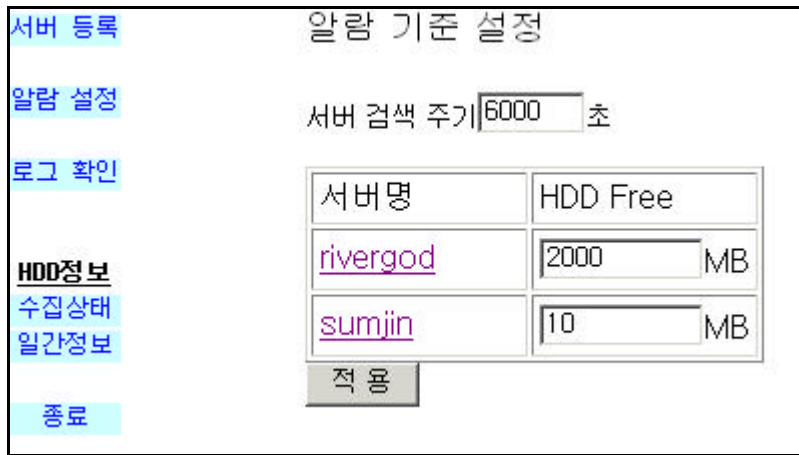
15



17. User Interface

5.4.5 User Interface

16 Event threshold Hard Disk
 , User Interface
 Threshold가 17 rivergod HDD
 가



18. User Interface

5.4.6 User Interface

17 User
 Interface /
 , /
 ,
 CPU, OS HDD
 Refresh 30

[관리대상 상태감시\(00-12-18 오후 2:53:24\)](#)

서버 이름	감시	CPU	OS	HDD	검색일시
rivergod	OK	OK	OK	NOK	12/18/00 13:39:08
sumjin	OK	OK	OK	OK	12/18/00 13:39:08

19.

User Interface

5.4.7

User Interface

18 CPU , Process list Status,
 Memory usage, Disk usage
 User Interface .

[관리대상 정보조회\(rivergod\)](#)

서버명	rivergod
Domain	DPNM
OS	Microsoft Windows NT Server
OS Ver.	
CPU Name	Intel Pentium III processor
Number of CPU	1
CPU Speed	0
Physical Memory	0 KB
Virtual Memory	0 KB
Total Disk space	4192964 KB
Free Disk space	1208288 KB
File System	NTFS
관리자	허 인
E-mail	hihurin@postech.ac.kr
연락처	279-5653
설치일	00-02-10
OS설치일	19990102

[서버정보 다시 읽기](#)

20.

User Interface

6.

Application Database, Global Table, File, Link Status, Queue(Printer), Error Log, Troubleshooting, Microsoft WMI, Built-in Service Provider

Service Provider 가
Service Provider
Database Management Application
Web
Web-based User Interface

가 가

PC Server, Back-End Program

가

[31]

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