



Global Distributed Storage Engineering

EMC Control Center 5.2 - Phase1

GDSE-05022-SG

Solutions Guide

v0.1

1. Version Control

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It is recommended that the latest version of the document be used from the GDSE website <http://gdse.ny.ssmb.com>. Newer versions may include expanded scope, or comments on issues discovered after deployment.

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6. Introduction

EMC Control Center (ECC) is a suite of applications for configuration, management and reporting of Storage resources in a SAN-connected Distributed Storage environment. Phase 1 of ECC deployment includes the Storage reporting functionality called StorageScope.

This Solutions guide aims to provide guidelines and covers various aspects of the ECC Storage Management and reporting, which includes architecture, implementation and best practices. Due the complexity of the product, all the details cannot be covered in this guide. Therefore, proper planning and training on architecture, implementation, configuration and use of the product is essential.

7. Business Drivers/requirements

7.1. *Functional Requirements: Phase 1*

The growth of Citigroup through mergers and acquisitions has led to an exponential growth of Citigroup's storage infrastructure across various business units. One of the constant and immediate challenges has been managing the storage growth in a cost-effective and flexible manner. This includes accurate storage inventory, consistent reporting of storage allocation and utilization, capacity planning and trending.

ECC StorageScope application will provide this functionality.

7.1.1. **Requirements: Future**

Future requirements of Storage management include:

- Reduce storage management costs
- Reduce storage provisioning time
- Provide consistent management tools and processes
The management platform should be consistent across Citigroup globally, employing similar configuration and management processes and procedures.
- Provide simplicity in managing
It should be simple to operate and manage the management infrastructure.
It should replace multiple point products in the provisioning process and eliminate manual record keeping.
- Enable audit and compliance of management activities
The Management platform should comply with Citigroup's security standards
- Remote Management
The architecture should allow local as well as remote management of the storage resources.

Based on the success of Phase 1, further functionality of ECC may be implemented to satisfy above requirements.

7.2. *System requirements*

The system requirements of a Storage Management platform are:

- Provide High availability and Disaster recovery

- Application should be configurable for HA and DR
- Provide simple to manage management platform infrastructure
 - Less overhead in managing the ECC infrastructure, minimum amount of servers are used, existing servers may be utilized etc.
- Provide low-cost infrastructure
 - Less space/rack and power requirements
- Provide secure management infrastructure
 - The ECC architecture should secure the Storage and SAN infrastructure from unauthorized access and should keep a log of user activity, adhering to all Information Security standards.
- Provide scalability
 - The application should be flexible and scalable to accommodate growth of storage.
- Provide easy integration
 - The application should be easily integrated into Citigroup's storage environment and applications.

8. Product Overview

8.1. *Functionality*

ECC is a suite of integrated applications that offer many storage resource management functionalities. These applications fall into three SRM categories¹:

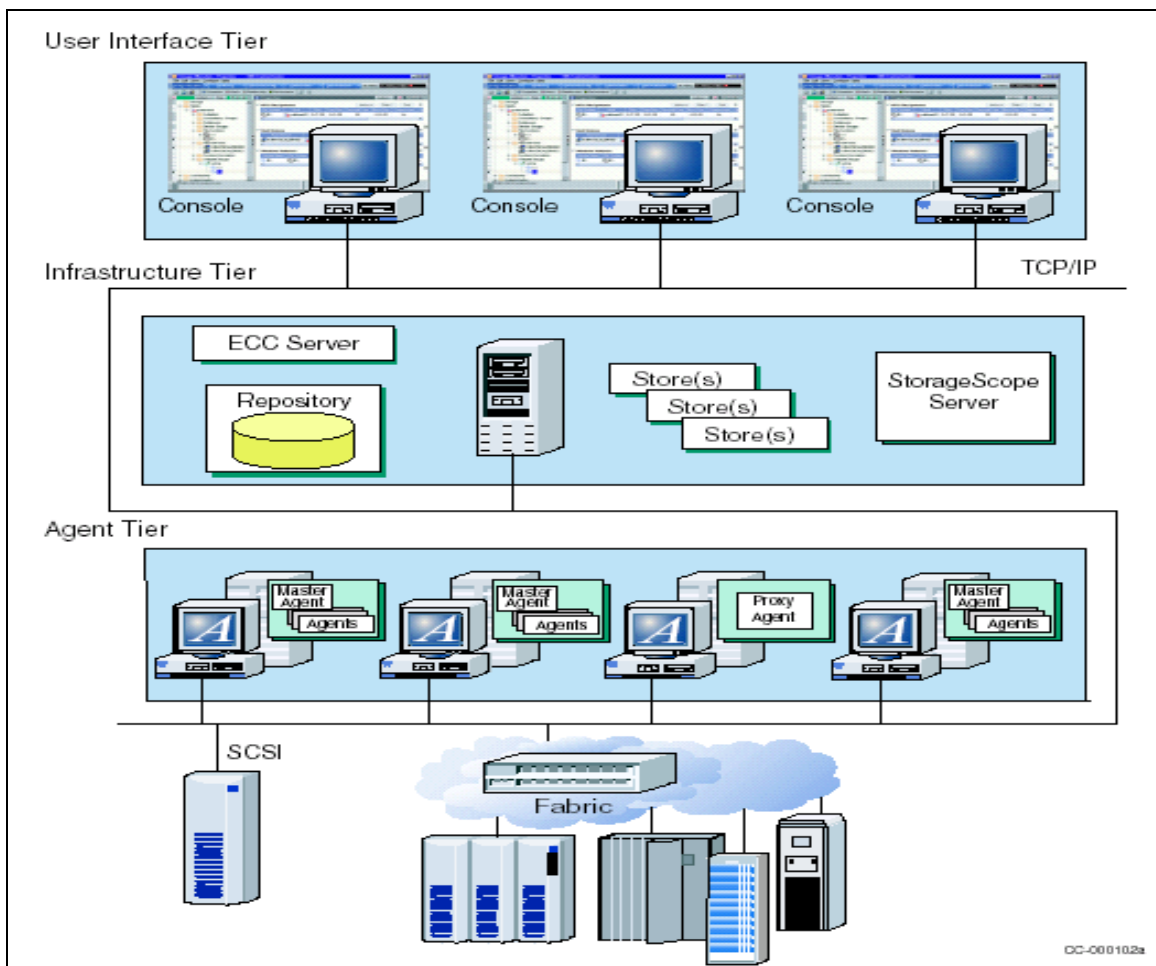
- **Planning and Provisioning**
 - SAN Manager
 - SAN Architect
 - Automated Resource Manager
- **Monitoring and Reporting**
 - Performance Manager
 - StorageScope
 - StorageScope File Level Reporter
 - Alert Manager
- **Storage Device Management**
 - Navisphere Manager
 - Symmetrix Manager
 - Symmetrix Optimizer

Please refer to the scope section for Phase 1 implementation.

8.2. *Application Architecture*

ECC 5.2 is a multi-tier application framework consisting of various functional components. Following *EMC's terminology*, there are 3 tiers within ECC framework, namely Infrastructure tier, Agents tier and User Interface tier.

¹ Please refer to related EMC documentation for more details.



8.2.1. Infrastructure-tier

It consists of ECC Server, Repository, Store and StorageScope.

ECC server

It is the primary interface between the ECC Console and ECC management infrastructure. It is a collection of common services and tools for various management functions. It retrieves data from the ECC repository for display by the Console. There is only 1 instance of ECC server per ECC application.

Repository

It is an integrated Oracle database (v9i), which holds current and historical information about all the managed objects in the storage environment. Repository is populated by the Store with persistent data from agents. There is only 1 instance of repository per ECC application.

Store

It receives the data sent by the agents, processes the data and updates the repository. There can be multiple instances of Store in the ECC management infrastructure based on the size of the storage environment.

StorageScope server

This is a reporting application, which provides a single point of control for storage infrastructure reporting. It correlates reporting metrics across various infrastructure elements being managed and provides capacity planning, trend analysis, asset management, charge-back etc. StorageScope has a separate web GUI.

8.2.2. Agents-tier

It consists of various agents for managing respective physical and logical objects in the Storage environment. These agents collect data, monitor health, and generate alerts about specific managed objects. Following is an outline of agents followed by brief description of agents covered in scope of Phase 1:

- Host agents for Solaris, HP-UX, AIX, Linux, and Windows
- Common Mapping Agent (CMA) for Sybase, MSSQL and DB2
- Database Agent for Oracle
- Integration Gateway Agent
- Physical agent for MVS
- FCC agent (for SAN switches)
- Symm and SDM agent (for Symmertix management)
- Clariion agent
- Integration Gateway (for EMS alerting)
- Others

Following is a tabular description of the agents covered in this scope:

Component/Port	Installed as:	Capability	Installed where	Installation
Master agent <i>Default port: 5798</i>	Root/admin	Provides initial host visibility of the host to ECC with hostname and IP address information, manages all other agents.	All hosts	Combined master and host agent package
Host	Root	Allows monitoring and management of hosts. Proactively monitors system resources, reports on storage issues as defined in policies and provide detailed alerts and information for corrective action. Host agent allows extending and mounting file systems, list files and directories, 'tar' Unix FS, explore and manage unix and windows users, page space (ux), processes/services, registry(W2k) and other non-storage entries. Note: Management capability can be restricted by data collection policies and user roles.	All hosts (Windows, Solaris, AIX, HP-UX)	
Oracle agent	Special ECC login ID	Database Agent for Oracle allows you to discover, monitor, and view configuration and allocation information for Oracle databases. You can also view real-time information about Oracle errors, initialization parameters, and user connection sessions. A single agent supports all the databases instances installed on the agent host (subject to scalability limitations) or any machines that can communicate with the agent host.	Hosts with Oracle DB	Pushed out from ECC

Common Mapping agent	Special ECC login ID	Common Mapping Agent allows you to discover and monitor (but not manage) databases and host configuration information locally on a single host or on remote hosts (via proxy).	Hosts with Sybase, SQL, DB2 databases	Pushed out from ECC
SDM agent	root	Read and updates VCMDB of managed Symms for configuration changes to volume access control. Enables LUN masking via SYMAPI.		Pushed out from ECC
Symm agent	root	It gathers real-time data that applies to the Symmetrix as a single unit, as well as to each component within the Symmetrix system. The agent tracks configuration and performance data for devices, ports, directors, physical drives, and Symmetrix arrays. The agent generates alerts relating to Symmetrix performance (based on threshold settings), overall system and individual component status, and error messages and alarms. Communicates to the Symm via SYMAPI.		Pushed out from ECC

8.2.3. User-interface tier

It consists of a java-based client and a web GUI. Java-based ECC console provides user access to the management platform for configuring and managing the storage environment. It is supported on Windows and Solaris platform. 10 concurrent console sessions are supported per ECC management infrastructure. The console session is not supported by EMC on the ECC infrastructure-tier server (but can be installed and run if required).

Web-based GUI is only used for monitoring purposes in the current release.

9. Scope of Implementation (Phase 1)

The scope of ECC certification, Phase 1 covers the following listed ECC applications. The scope is based on various business requirements as defined by Storage Management.

Please note: This is a new storage reporting (and future management) application infrastructure and does not change, replace or integrate with existing Storage Management tools and infrastructure in Phase 1. Therefore, existing tools for configuration, monitoring, management and audit/compliance will continue to be used.

9.1. Application/ licenses

Base ECC does not require license. Other licenses required for ECC StorageScope reporting functionality are:

- StorageScope API /StorageScope
- SAN Manager
- Symm Manager
- Clariion agent

9.2. ECC Components

Based on the business functional requirements, following ECC components are in scope:

- All Infrastructure-tier components (as outlined above)
- Master, host, Symm/SDM, Clariion, Oracle, Common Mapping agents
- Web-based StorageScope GUI
- Java-based console (to be used only for initial configuration and administration)

For pre-reqs of ECC application and its components, please see section 10.3.

9.3. Environment

The scope of server and storage environment included in Phase 1 is based on Citigroup's business requirements of storage reporting in NA. Generically, following hardware and Operating systems are in scope of Phase 1 ECC reporting. **Actual management of particular systems will depend upon meeting the ECC pre-requisites as per support matrix.**

<i>Hardware</i>	<i>Type</i>	<i>Models</i>
Storage Arrays	DMX	1000, 2000, 3000
	Symm	3930, 5830, 5930, 8430, 8530, 8730, 8830
	Clariion	FC4700, CX400, CX600
Hosts	Sun(UX)	E3500, 4500, 6500, 3800, 4800, 6800, 240, 440, 250, 450, 880, 1280, E10K, E15K
	HP(UX)	K580, K370, RP5450, RP8400, RP7400
	IBM(UX)	P620, P30, P650, P660, P690, S85
	Intel(Windows)	HP/CPQ, Dell, IBM
HBA	Emulex	LP8000-EMC, LP9002,DC
	JNI	FC64-1063-EMC, FCE-1063-E
	Qlogic	QCP-2200F-EMC
	Tachlite	A6795A, A6685A
OS	Solaris	2.6, 8
	HP-UX	11, 11i
	AIX	4.3.3, 5.1
	Windows	2000

Note: Please refer to the Pre-reqs document for details on specific models, drivers, microcode, firmware

10. Infrastructure configuration

The ECC infrastructure has been custom-sized for each site in the NA. For all the other regions, the ECC infrastructure has to be customized in conjunction with EMC. The current sizing of ECC infrastructure will be able to accommodate the subsequent phases of ECC implementation as well.

10.1. Infrastructure summary

1. ECC Management server (incl. Repository, StorageScope)²
2. ECC Store server(s)
3. ECC Symm agent server(s)
4. ECC Clariion agent server(s)
5. ECC Console server

10.2. Infrastructure architecture

Based on the size of the Citigroup's storage environment, ECC infrastructure is categorized as³:

10.2.1. Single infrastructure architecture

This infrastructure design is for small storage environments. In this design, the ECC 'infrastructure-tier' components i.e. ECC server, ECC Repository, ECC Store and ECC StorageScope are placed on a single server. Besides Master and Host agent, this server may or may not have other (e.g. Storage/SAN management, WLA etc.) agents. Please consult with ECC Performance and Scalability guidelines and EMC for sizing the infrastructure.

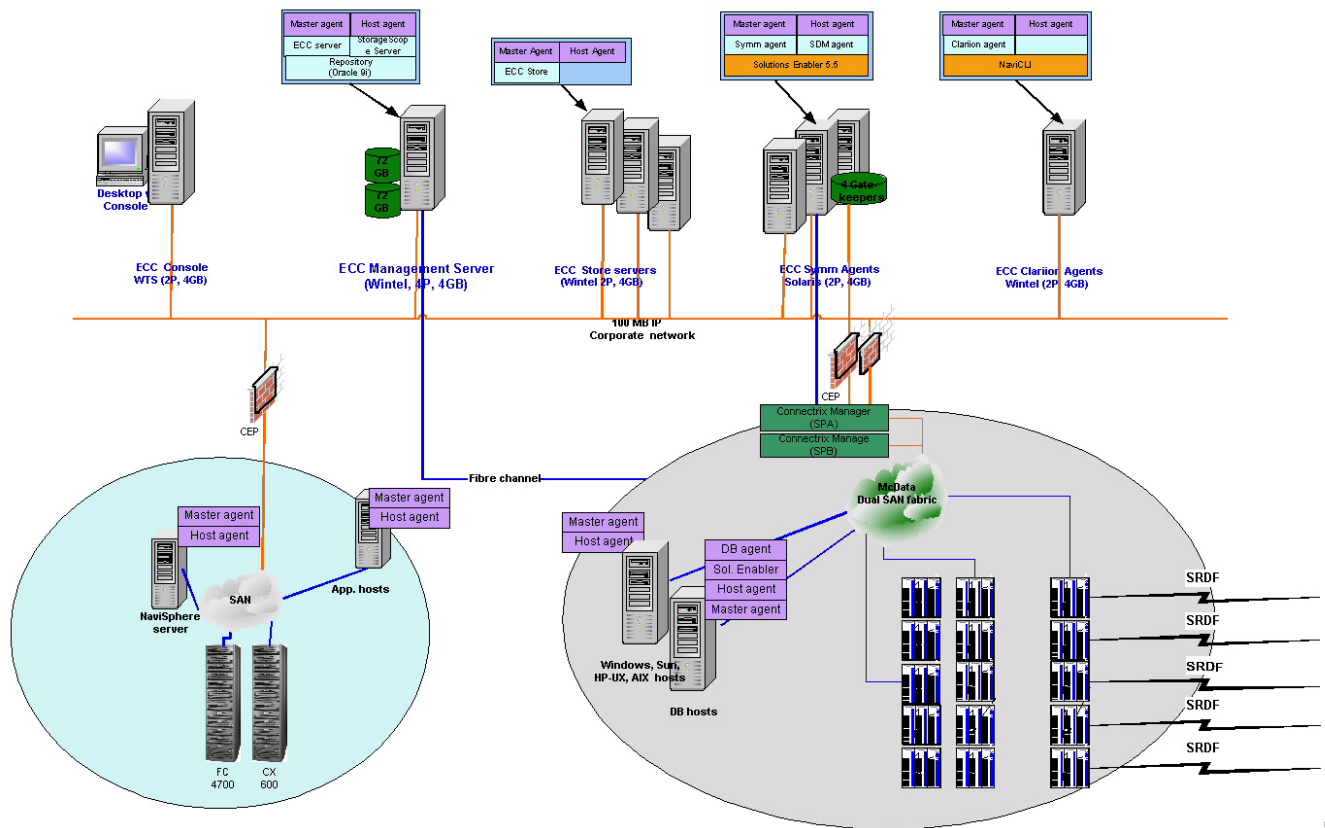
10.2.2. Distributed Infrastructure architecture

This design is for large storage environments. In this design, the ECC 'infrastructure-tier' components are distributed on multiple servers. Storage, SAN and other agents are installed on separate dedicated Agent servers.

² A dedicated StorageScope server for customized and multi-site reporting may be installed for each region. e.g. NA region will have a dedicated STS server other than ECC Management server.

³ As per ECC's terminology

EMC Control Center (ECC) Management Infrastructure Architecture (large sites)



10.3. Application pre-requisites

Following are pre-reqs for various ECC agents:

ECC Component	Pre-requisites	Remarks
Repository	Windows server, eccadmin account, ECC install tools	
ECC server	Repository	
Store	ECC server	
StorageScope	ECC server	
Master agent	OS as per support matrix, root access	Package
Host agent	Master agent, HBA SNIA API	Package
Symm/SDM agent	Solutions Enabler	ECC push install
Clariion agent	NaviCLI	ECC push install
Oracle agent	Solutions Enabler	ECC push install
Common Mapping agent	Solutions Enabler	ECC push install
ECC Console	W2K, JRE 1.4.2	ECC install

Component	Function	Resides	Version
Solutions Enabler (for Symmetrix & SDM agents)	Includes SYMCLI, SYMAPI. Provides Symm/SDM agent access to Symm and VCMDB via	ECC Symm/SAN Agents server	5.5 (verify Symm MC dependencies)

	symapisrv and gatekeepers		
Solutions Enabler (for DB agents)	Provides Oracle/CMA access to DB information	On DB servers	5.5 (verify SE security on production hosts)
Gatekeeper devices	Provides access to the Symm VCMDB	Symm	4 GK per symm agent server
VCMDB	Masking Database	Symm	Type III/IV
NaviCLI (for Clariion agent)	Provides access to CLARiiON management	ECC CLARiiON Agents server	6.6 (verify Flare code dependencies)
HBA SNIA API (for Host agent)	Provides standards-based HBA discovery and management	Host Bus Adapter (on host)	1.0 (specific details in pre-reqs. document) /usr/lib/libemulexhbaapi.so

10.4. Infrastructure sizing

All servers for ECC infrastructure should be ordered as per Citigroup's Wintel/Unix standards.

10.4.1. ECC management server (distributed infra)

Wintel 4P, SAN-attached, Windows 2000 Advanced server SOE build
2.8GHz (or higher) Intel Xeon processors
4 GB of Memory
Dual NIC (NIC teaming is currently not supported)
Disk: 2x 64GB vols, Symm (optional SRDF)

10.4.2. ECC Management server (Single infra)

Wintel 2P, SAN-attached, Windows 2000 Advanced server SOE build
2.8GHz (or higher) Intel Xeon processors
4 GB of Memory
Dual NIC (NIC teaming is currently not supported)
Disk: 2x 36GB (or more), Symm (optional SRDF)

10.4.3. ECC Regional StorageScope server

Wintel 2P, SAN-attached, Windows 2000 Advanced server SOE build
2.8GHz (or higher) Intel Xeon processors
4 GB of Memory
Dual NIC (NIC teaming is currently not supported)
Disk: 2x 36GB (or more), Symm (optional SRDF)

10.4.4. ECC Store server

(not required for single infrastructure sites)
Wintel 2P, non-SAN, Windows 2000 server SOE build
2.8GHz (or higher) Intel Xeon processors
4 GB of Memory
Dual NIC (NIC teaming is currently not supported)
Disk: Internal, 5GB mirrored or higher for app

10.4.5. ECC Symm agent server

Sun 2P, SAN-attached, Solaris 8 SOE build

4 GB of Memory

NIC : standard

Disk: Internal, 5GB or higher for app

2x LP9002 HBAs

10.4.6. ECC Clariion agent server

Wintel 2P, non-SAN, Windows 2000 server SOE build

2.8GHz (or higher) Intel Xeon processors

4 GB of Memory

Dual NIC (NIC teaming is currently not supported)

Disk: Internal, 5GB mirrored or higher for app

10.4.7. ECC Console server (if deployed)

Wintel 2P, non-SAN, Windows 2000, SOE build

2x 2.8GHz (or higher) Intel Xeon processors

4 GB of Memory (more based on # of consoles reqd.)

Dual NIC

Disk: Internal, 5GB mirrored or higher for app

10.5. Network

All the ECC servers should be placed on the corporate LAN with the following configuration:

- 100Mbps
- Fixed IP addresses
- Machine name is 15 or less characters
- Only 1 NIC is configured on ECC servers: NIC teaming is disabled
- Windows Active Directory authentication is available
- DNS services are available
- No underscores in the machine name

10.6. High Availability

In phase 1, the ECC infrastructure is standalone with no HA. For application HA, please see the next section.

11. Application installation and configuration**11.1. Installation summary**

ECC Phase 1 deployment includes:

- Installation of ECC server and repository on a dedicated ECC management server per site.

- Installation of ECC StorageScope on the ECC management server⁴.
- Installation of ECC Store on dedicated store servers.
- Installation of Master and Host agents on every application server as supported by ECC (Windows, Solaris, HP-UX and AIX) including ECC infrastructure/agent servers.
- Installation of DB agent for Oracle and Common Mapping Agent for MSSQL, Sybase and DB2 on all DB servers.
- Installation of EMC's Solutions Enabler 5.5 on all DB servers
- Installation of Symmetrix/SDM, Clariion agents on dedicated Symm/Clariion agent servers.

11.2. Installation prerequisites checklist

11.2.1. Network

1. **Ensure that DNS is set up correctly:** Verify that DNS is properly configured and active. It is recommended to specify host network names instead of IP addresses during Control Center installation. Use forward and reverse nslookup to verify.
2. **Check network connectivity:** Ensure that the Control Center infrastructure hosts have active connections to all network resources that Control Center is to monitor. Use the ping command to check connectivity between the infrastructure hosts and network resources.
3. **Check network latency:** Do the following to maintain network performance and minimize network latency. Plan to install Control Center infrastructure components on the same physical network switch. Ensure that latency between the infrastructure, agents, and Console interfaces is about 8ms. Use the ping command to check latency between hosts where Control Center components and products reside.

11.2.2. Infrastructure servers (ECC Server, Store, StorageScope)

1. VNC (if needed) is configured for remote installation.
2. JRE 1.4.2_03 is needed for installing Console client.
3. The fully-qualified domain names (FQDNs) and hostnames do not contain underscores.
4. The hosts do not have network interface cards (NICs) that are configured for DHCP. Use static IP address only.
5. The hosts do not have network interface cards that are configured for Windows internet Naming Service (WINS).
6. Network Time Protocol configured and running to synchronize server clock/time
7. Local 'eccadmin' user with local administrator rights is created.
8. No Oracle software is present.
9. Terminal Services is disabled.
10. Distributed Transaction coordinator service is disabled.

⁴ A dedicated StorageScope server for customized and multi-site reporting may be installed for each region. e.g. NA region will have a dedicated STS server other than ECC Management server.

11. Anti-virus software is disabled.
12. smtp gateway is identified.
13. No applications are currently running (to ensure that the Control Center installation wizard has adequate available memory to perform installation tasks).
14. Ensure %SYSTEMROOT%, for instance c:\WINNT\system32, is present in the PATH environment variable.
15. 36GB or more of SAN disk available and assigned to drive/volume other than Operating System volume for ECC server
16. Same disk size is available to perform repository nightly backups and archive logging on ECC server.

11.2.3. Symm/SDM agent server

1. Solutions Enabler is installed.
2. Minimum four Gatekeepers assigned.
3. VCMDB is visible.
4. Semaphores are set properly as follows:


```
set semsys:seminfo_semmni=600
set semsys:seminfo_semmns=600
set semsys:seminfo_semume=600
set semsys:seminfo_semmnu=600
set shmsys:shminfo_shmmax=1048576
set shmsys:shminfo_shmmni=600
set semsys:seminfo_semmap=152
```
5. Master/host agent is installed.
6. Agent server is visible in the ECC console.
7. Fan-in ratio of # of Symms managed per Agents server is planned in conjunction with EMC.

11.2.4. Clariion agent server

- The Navisphere SP Agent is installed and running on the CLARiiON FC4700/CX series Storage Processors (SPs), or the FC4500/FC5300 SP hosts.
- The Access Logix software is installed and enabled on the CLARiiON FC4700/CX series SPs, or the FC4500/FC5300 SP hosts.
- JRE 1.4.2_01 or higher (required by NaviCLI) is installed on server where CLARiiON Storage agent will be deployed. Ensure that the JRE location is in the PATH.
- The Navisphere CLI software is installed and enabled on the host where the CLARiiON Agent is running – Version 6.6 or above.
- CLARiiON unit serial numbers are set to **Array** in Navisphere.
- If Navisphere is used for security, add **SYSTEM@hostname** (where *hostname* is the network name of the target host) to the list of privileged users.

11.2.5. Application hosts

1. Every host should be able to resolve the name of the ECC Management server.

2. The Master/host agent requires 'root' and 'administrator' rights for installation (on respective OS).
3. On an average, the two agents will require about 300-500MB of disk space for installation and storing agent logs depending on OS.

11.2.6. DB hosts

1. Every host should be able to resolve the name of the ECC Management server.
2. The Master/host agent requires 'root' and 'administrator' rights for installation (on respective OS).
3. About 500MB of disk space for installation and storing agent logs is available.
4. UserIDs are created for all DB instances on a host for Sybase. (refer to Appendix)
5. A UserID is created for all DB instances on a host for Oracle. (refer to Appendix)
6. A System DSN (under ODBC Data Sources) is created (and tested) in MSSQL for ECC.

11.3. *Installation/Configuration details*

Please Note: In the current release of ECC, some agents and components have to be push installed via the ECC Console. Please make sure appropriate process/procedures are been followed.

11.3.1. ECC server, repository, StorageScope

These components are packaged and available on gdsgold by wrapID emcc521a. Please read the Readme.txt (provided with the wrap) for installation instructions.

- Follow the installation steps of the application and fill in the appropriate information fields.
- Reboot the server after installation of application.
- Apply SP1 (wrapID emcsp11a)
- Apply SP1 patches (wrapID emcph1a)

Following services are installed:

1. EMC ControlCenter ECCAPI server
2. EMC ControlCenter Performance Manager Automated Reports
3. EMC ControlCenter Server Server
4. EMC ControlCenter StorageScope
5. EMC ControlCenter WebApplications Server
6. EMC ControlCenter WebConsole Server
7. OracleECCREP_HOMETNSListener
8. OracleServiceRAMBDB

11.3.2. ECC Store

This component is installed from the same package as ECC server with wrapID emcc521a. Install this after ECC server.

- Follow the installation steps of the application and fill in the appropriate information fields.
- Reboot the server after installation of application.
- Apply SP1 (wrapID emcsp11a)
- Apply SP1 patches (wrapID emcph1a)

Following services are installed:

1. EMC ControlCenter Store

11.3.3. Master/Host agent

These components are packaged together for each host platform as mentioned earlier. Please follow the instructions in the package. Windows package is emha521a.

- Master/host agent should be installed in the E:\ecc\exec on W2K or /export/opt/emc/ecc on Unix
- Agent is automatically started at the time of installation.
- Deploy the agents on various hosts in a phased manner.
- Once the host agent fully discovers the host, information about HBAs, File systems, host devices, system information etc will be displayed under each Host sub-tree.

11.3.4. Symm/SDM agent

These agents are installed via ECC. Master/Host agent needs to be installed on these servers.

- Symm/SDM will automatically start the discovery of objects at the time of installation.
- Install the Symm/SDM agents on different servers in a phased manner, usually after the previous one has discovered the Symms properly.
- The Array information appears under storage tree

11.3.5. Clariion agent

This agent is installed via ECC.

- Master/Host agent needs to be installed on the corresponding server(s).

11.3.6. Oracle agent

- Push install Solutions Enabler via ECC
- Start symapisrv at the request of Storage Integration before configuring the DB agent. Symapisrv does not start by default. It will need to be started by the system administrator using root privileges.

Note: For automatic startup, the line below should be added to the system startup script or the Control Center Master agent start script /usr/ecc/exec/start_master.csh.
i.e. symapisrv start -bg -port 2707

- Push install Oracle agent via ECC

11.3.7. Common mapping agent

- Push install Solutions Enabler via ECC

- Start symapisrv at the request of Storage Integration before configuring the DB agent. Symapisrv does not start by default. It will need to be started by the system administrator using root privileges.
Note: For automatic startup, the line below should be added to the system startup script or the Control Center Master agent start script /usr/ecc/exec/start_master.csh.
i.e. `symapisrv start -bg -port 2707`
- Push install CMA via ECC.

11.3.8. StorageScope server (Dedicated Regional)

Please refer to document on customized StorageScope reporting (in progress)

11.4. Data Collection Policies

11.4.1. Overview

Each ECC agent collects various types of data from the managed objects at periodic intervals, based on user-configurable attributes. Data Collection Policies are used to manage the information that is gathered by the agents and sent to ECC server. ECC provides a set of default policy definitions and templates for scheduling and configuring the data collection policies. Broadly, the policies are associated with the following functions:

- Discovery
- Configuration
- Status
- Performance Statistics
- Logs

DCPs can be configured as follows:

- Start data collection automatically upon startup
- Require manual configuration to collect data
- Require that data collection policies are defined, assigned, and enabled to manage how and when the data is collected
e.g The initial discovery of Hosts and Symm start automatically.

11.4.2. Recommendations

- ‘Discovery’ policies for monitored objects should be enabled (Phase1):
 - Host agents
 - Clariion agent
 - Storage agent for Symm
 - Symm SDM agent
 - Oracle agent
 - Common Mapping agent
- Examine all other DCPs enabled by default and disable any if not required per business needs.
- Daily host discovery policies should be configured to run during off-hours keeping in view various host-specific tasks such as backup, batch processing etc. They

should be spread over a period of time so as to limit the data on the network as well as ECC Store processing limitations. It is recommended to schedule the discovery of up to 250-300 hosts per hour.

- Policies may be applied to all objects and/or selected objects as per the business requirements.

Note: WLA policies are not covered in this scope. Hence, they should not be enabled.

11.5. Scalability

The ECC application is scalable and can accommodate growth of monitored/managed objects. More agents can be added as per the growth of the environment.

11.6. High Availability

In Phase 1, the ECC application is configured as standalone with no HA. However, the application DB is configured on a SAN disk, which is backed up and also replicated in some instances. The application however can be configured for HA in subsequent phases of ECC implementation.

Note: ECC Store component is sized based on the monitored objects. However, if 1 store server fails, ECC error recovery will eliminate that store from the list and future agent requests will be handled by remaining stores based on the Store workload.

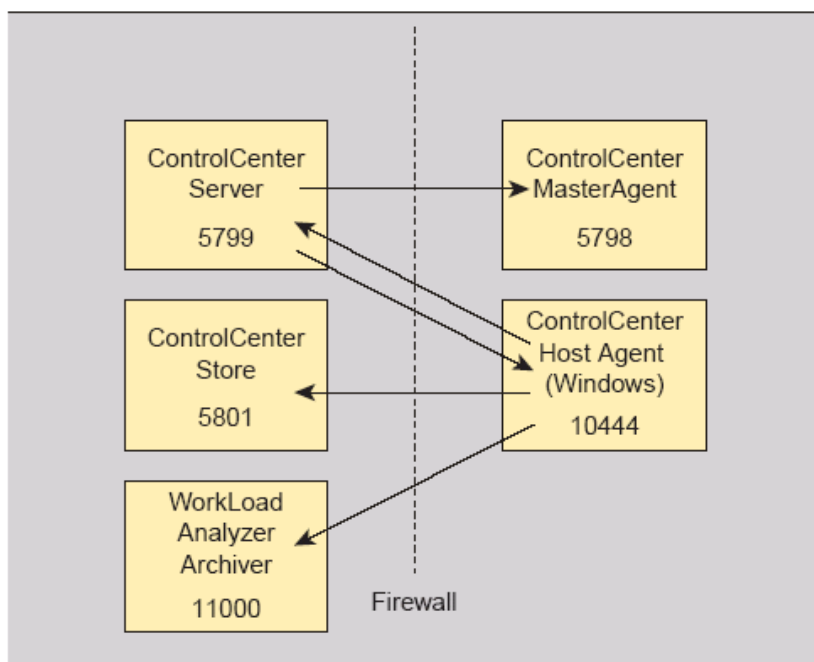
12.Security configuration

12.1. Network security

ECC infrastructure is classified as confidential and need not be installed behind a firewall. However if the host servers with master & host agent are behind a firewall, then ports 5798, 5799, 2707 (for symapisrv on DB server), 5801, 10555(for Solaris Host agent) need to be opened. Please see the diagram below.

ECC Infrastructure

SUN Cluster Servers



Various ECC application infrastructure servers communicate with each other over IP. Different ports are used by various services and agents. Please refer to the appendix for port listing. Since these servers are deployed on the corporate network and are not Internet facing, there are no special procedures to secure these servers from a network perspective. BAU procedures applies.

12.2. Data and access security

ECC server and its components store business confidential data.

Repository

User does not have access to the Repository Database except via StorageScope API for reporting. However, there should be a change control process to stop any Oracle services on the repository server.

12.3. Agents Security

12.3.1. Overview

Various ECC agents are at the core of performing different management and configuration functions of managed objects. These agents run as *root* and have complete administrative privileges to perform various functions. Therefore managing agents is a very important role in ECC. Various Agent Management operations include:

- Install

- Upgrade
- Start
- Stop
- Uninstall
- Restart Master Agent (cannot shut down agent via ECC)
- Update configuration
- View install logs
- Apply patch

Only users granted with these permissions (including ECCAdministrators) can perform these operations.

Note: Agent is installed and run as root.

12.3.2. Recommendations

- Change control process to edit any agent configuration files (.ini)
- Change control process for installing and uninstalling the agents.
- Change control process for starting and stopping of agents.
- Create user rules such that opposing tasks are performed by different persons.

12.4. Users and Rules administration

Managing user access to the Storage Management infrastructure is one of the key aspects of implementing ECC. ControlCenter allows a very granular management of User groups and privileges and tracks all the activities performed by the user. By default, all users will have a read-only access to ECC.

12.4.1. Default User groups and Rules

There are several default user groups and rules as outlined below:

- **ECCAdministrators**
This group includes people with overall responsibility for managing ControlCenter, including defining security policy (creating ControlCenter users and authorizing them to do things). The ECC Administrators group may not be renamed or deleted. A minimum of 1 user is required in the 'ECCAdministrators' user group to perform the initial users, groups and rules creation. Membership in this group should be strictly limited. 'ECCAdministrators' user should create the initial users, user group (e.g. User_Manager) and corresponding rule (e.g. User_Management) to allow for the creation of ControlCenter users.
- SAN manager
- Symm Configuration manager
- Symm Data protection manager
- Symm Performance manager

12.4.2. 'eccadmin' user account

This account is required on the local system for installation of ECC Infrastructure components namely ECC Repository, Server and Store components on respective servers. This account is part of the Administrators group on the system.

- By default, 'eccadmin' user account is part of the ECCAdministrators group within ECC.
- It has all rights on the ECC servers and its activities are not logged.
- It is required for the first logon on to the ECC infrastructure and creation of the first user(s) account in ECC application.
- 'eccadmin' account can be disabled after it creates the first userID that is part of the 'ECCAdministrators' user group.

12.4.3. Recommendations

Except 'eccadmin' user, all ControlCenter member users must be valid Windows Active Directory or Windows domain users. There should be no other local machine account on the ECC Management server.

- Create new Users in ECC by adding existing Windows domain users in the ECC users tree. Do not assign the users to any user groups initially.
- Create new User groups in the ECC User Groups tree based on functional responsibilities and separation of duties.
- Establish User groups for User Account Manager Data, Data Collection Policy, Agent and StorageScope reports. e.g.
 - Create Manage_Users group
 - Create Manage_Usergroups group
 - Create a StorageScope_admin group
 - Create a StorageScope_user group

Note: Customized user groups based on 'object groups' such as specific arrays, hosts or switches can also be created and specific management rules be applied to them.

- Create new rules, which will correspond to the new ECC user groups functions in the Authorization Rules tree. e.g.
 - Create a Reporting rule with 'StorageScope Report' action set to StorageScope admin
 - Create a Reporting rule with 'StorageScope Report' action set to StorageScope user
- Assign the users to user groups based on their responsibilities.

For Phase1, no users are required in the default ECC user groups except ECC administrators.

13. Product Functionality

13.1. Object Discovery

13.1.1. Host discovery

Hosts are discovered as soon as the agents are started. They are rediscovered as per the schedule in the DCP.

- Verify that all the hosts are discovered as per the server list.
- Verify that the properties of each host are correct.
- Create new custom groups based on Line of Business (LoB).
- Drag and drop hosts from the host tree to the LoB group.

The servers are not removed from the host tree. LoB host entry is a link to actual host entry.

13.1.2. Symmetrix discovery

These objects are discovered at the time of agent installation (runs automatically)

- Verify all the storage objects are discovered completely (there is no diamond on the object – diamond indicated partial discovery)
- Verify that the properties of each storage object are correct.
- You may drag and drop the storage objects in the LoB group along with the hosts accordingly.

13.1.3. Clariion discovery

The discovery settings depend on the CLARiiON model. Click one of the following tabs in the Discover Other Objects dialog box:

- FC4500/FC5300—The hostname of the node that is connected to the SP on the CLARiiON array to be discovered.
- CX200—Name of storage processor (SP) A, name of storage processor (SP) B (not required if only one SP is used), and the global username and password that Storage Agent for CLARiiON will use to access the array.
- FC4700/CX except CX200—Name of storage processor (SP) A, name of storage processor (SP) B, and the global username and password that Storage Agent for CLARiiON will use to access the array.
- SMI Provider—Provider hostname, port, namespace, global username and password, time-out interval, and optionally the SSL certificate store path (the full path, including file name, of the file containing the SMI Provider's client certificate, used for authentication by Storage Agent for SMI).

Note: If you specify an incorrect username/password combination in the Discover Other Objects dialog, Storage Agent for CLARiiON will not discover metaLUNs. In this situation, do the following to enable metaLUN discovery.

1. Select the partially discovered CLARiiON from the tree panel in the Console.
2. Use the top menu Discover -> Remove Permission to Manage... command to launch the Remove Permission to Manage CLARiiON dialog box.
3. Uncheck the correct CLARiiON agent from the Remove Permission to Manage CLARiiON dialog box and click OK.

4. Discover the CLARiiON again though ADA by using correct user name\password.

13.1.4. DB discovery

DBs are discovered manually via the wizard. The DB management team will create DB UserIDs with privileges mentioned above and detailed in the appendix.

Oracle and CMA agent are pushed out from ECC.

All instances on a host are discovered separately via ECC assisted discovery.

DBs on a host can also be discovered via proxy agent running on another DB host.

In order to discover a **Oracle Database** Instance, DBA will require the following information for each instance:

Hostname (as used in **tnsnames.ora**)

Oracle BASE

Oracle HOME

Oracle SID

Listener Port # (default 1521)

Sys Password (**dummy**)

Database Agent User Name

Oracle Agent User Password

Note: Make sure to use the hostname/Fully Qualified Domain Name (fqdn) configured in the Oracle tnsnames.ora or the discovery will fail. If the hostnames-fqdn in the tnsnames.ora is not the same as the name identified in the host name drop down list you will be required to type hostname-fqdn instead.

In order to discover a **Sybase, SQL, DB2 Database**, the DBA will require the following information for each instance:

Sybase Host Port (default 2707)

DB Instance

DB Password

DB Type Sybase

DB Home

SYBASE OCS

13.2. *StorageScope reporting*

This is the core functionality of ECC in Phase1. The reporting functionality of this application is customized for Citigroup.

Please refer to Customized reporting document (in progress)

14. Performance

14.1. Infrastructure performance management

In Phase 1, performance of the application will not be monitored proactively.

14.2. ECC performance management function

In Phase1, this function is not in scope for NA region. Please work with GDSE if this is a requirement for other regions

15.Fault Management

15.1. Infrastructure fault monitoring

The ECC infrastructure servers should be monitored using BAU procedures. However, health of various agents should be monitored via the Alert Management function of ECC via the Console.

15.1.1. Alert management policies

Alert Management policies should be enabled for all ECC servers and storage agents.

15.2. ECC Alert Monitoring function

Alert monitoring of Storage objects via ECC is not in scope for Phase1. Integration of alert monitoring via EMS is not in scope of Phase1 implementation.

16.Disaster Recovery

Disaster Recovery and Backup/Restore SLAs depends upon the business requirements of RPO & RTO. In phase1, the ECC infrastructure is not configured for DR. However, the ECC repository is backed up daily by the application and the ECC Management server should be backed by the standard backup procedures. Other servers such as ECC Store and Agents server need not be backed up.

16.1. Backup

16.1.1. ECC Management server

Server will need to have full backup performed monthly and incremental backups performed daily. The minimum data retention period should be to retain at least 2 full backups and all the incremental backups associated. This will protect from tape media tape failure.

Backups should be scheduled around the following automatic tasks:

1. Hotbackup database job that runs daily at 2:00 a.m. and can be expected to complete by 6 a.m.
2. Export Backup that runs daily at 10 p.m.(ramdb_export_db.bat)

Both backup jobs are stored in the RAMBACKUPDIR environment variable directory.

When backing up the database components, the following open files need to be excluded from the backup process:

%RAMBOH%\Repository\oradata\rambdb*.CTL

%RAMBOH%\Repository\oradata\rambdb*.LOG

%RAMBOH%\Repository\oradata\rambdb*.DBF

This also applies to any 3rd party monitoring tools, such as BMC Patrol, as the external locks that this tool places on files is intrusive to Oracle - see Oracle metalink doc id # 2969011 for one of many references on this issue.

For recovery purposes, when backing up the database components, the following files need to be included in the backup process:

%RAMBBACKUPDIR%\hot*.*

%RAMBBACKUPDIR%\exp*.*

%RAMBOH%\Repository\oradata\rambdb\archive*.*

%RAMBOH%\Repository\database\PWD*.*

%RAMBOH%\Repository\database\SP*.*

%RAMBOH%\Repository\admin\rambdb\udump*.*

%RAMBOH%\Repository\admin\rambdb\pfile*.*

Need to exclude the following open database files:

- %RAMBOH%\Repository\database*.CTL
- %RAMBOH%\Repository\database*.LOG
- %RAMBOH%\Repository\database\rambdb*.DBF

16.1.2. Other ECC application servers

Other servers need not need backup since they cannot be restored from the backup image.

16.2. Recovery

16.2.1. ECC Management server

Install the ECC application from the wrap and restore the repository DB working with EMC application support services.

16.2.2. All other servers

Install the application components from the application wraps.

17.Audit Management

17.1. Activity logs and Auditing

17.1.1. Overview

ControlCenter provides both a log of user activity, stored in a log file, and a Command History of user actions, which is stored in the Repository. This is accessed via the ECC console.

- Command history provides a tabular view of all the console user-issued commands. For examples it contains the history of logins and logoffs, User Management commands and Authorization Rule replacements etc. The Command history is available from the ECC monitoring menu. Please see Appendix for details.
- All the ControlCenter activities are captured in log files and archived. They can be found in `../ecc/ecc_inf/data/eccservername/data/` directory with `.trc` suffix on the ECC Management server. These files give detailed messages about activities that are performed by ControlCenter including authorized, unauthorized as well as suspicious activities. Please see Appendix for a list of trace for Infrastructure files.
- Agent logs are available on respective servers. Respective Hosts also have Master and Host agent logs in the ecc directory. Please see Appendix for examples.
- Symm Audit log: History of commands performed on a Symm can also be obtained from specific Symm object via ECC. On the Symm Agents server, the log files are stored at `C:\ProgramFiles\emc\symapi\log`. This log also contains information about non-ECC performed functions.
- Clariion Audit log: Clariion logs can be obtained locally from the array. ECC does not have the ability to import the Clariion logs.
- McData audit log: McData logs can be obtained locally from the switch. ECC does not have the ability to import the McData logs
- Brocade audit log: Brocade logs can be obtained locally from the switch. ECC does not have the ability to import the Brocade logs

17.1.2. Recommendations

When examining a log, you should look for general actions such as:

- Users doing unusual things (for example, performing operations outside their expected authority). This could indicate a flaw in the way a security policy is set up; a user may have been inadvertently granted more authority than is desirable.
- Users doing authorized things at unusual times. This could indicate that someone else is using the user's account (has stolen the user's password).
- Repeated access denials. This could indicate someone who is attempting to break into a system or is testing the limits of an account.
- Unusual starting and stopping of services.
- Unusual addition and deletion of agents.

For detailed information on analyzing logs, please refer to ECC Troubleshooting Guidelines/Help. Certain utilities are available from EMC to analyze logs.

18. Appendix

18.1. *Operational architecture design considerations*

Various design considerations for ECC Management Infrastructure design within Citigroup are:

- ECC application requirements and limitations
 - Application architecture
 - OS and hardware requirements
 - Agents scalability
 - Agents placement
 - Solutions Enabler
 - Network latencies
 - ECC roadmap
- Storage environment
 - No. and size of storage systems (Symm, Clariion)
 - No. and size of interconnectivity devices (Switches, directors)
 - No., type and size of hosts and databases
 - Future growth of environment
 - SRDF relationships (for Symmetrix)
 - Network proximity of data centers
 - IP Network topology around Storage Components
- ECC application usability
 - Discovery policies
 - Data collection policies(DCP)
 - Workload Analyzer collection policies
 - Frequency of data collection (discovery and performance)
 - Storage configuration frequencies
 - No. of concurrent objects to be monitored
 - StorageScope reporting
- High Availability and Disaster Recovery requirements
 - High Availability of various components for short-term outages
 - Disaster Recovery/COB requirements in case of site disaster

18.2. *HBA SNIA library*

The library locations are as follows:

Windows Hosts:

Emulex Cards - C:\winnt\system32\emulexhbaapi.dll

Qlogic Cards - C:\winnt\system32\qlsdrm.dll

(NOTE: For Windows 2000 and Windows 2003 look for them in the \$SystemRoot\system32 folder.)

Solaris Hosts:

Jaycor Cards - /opt/JNIsnia/Solaris/Jni/32-bit/JniHbaLib.so

Emulex Cards - /usr/lib/libemulexhbaapi.so

QLogic Cards - /usr/lib/libqlsdrm.so

HP-UX Hosts:

HP Cards - /usr/lib/libhbaapihp.sl

AIX Hosts:

Not applicable. AIX does not supply snia libraries.

18.3. Log File and Agent Information

The following table shows the Log File information.

Table: ControlCenter Default Trace and Log file Locations

Name	Location	Description
server.trc	<installation root>\ecc inf\data\<hostname>\data\	Server trace
store.trc	<installation root>\ecc inf\data\<hostname>\data\	Store trace
console.trc	Program Files\<installation root>\console\data\	Console trace
consoleLaunch.log	Program Files\<installation root>\console\bin\	Console launch log
snmpcollector.log	<installation root>\ecc inf\data\<hostname>\data\	SNMP collector trace
server_output.txt	<installation root>\ecc inf\data\<hostname>\	Server output
servershutdown_output.txt	<installation root>\ecc inf\data\<hostname>\	Server shutdown output
store_output.txt	<installation root>\ecc inf\data\<hostname>\	Store output
storeshutdown_output.txt	<installation root>\ecc inf\data\<hostname>\	Store shutdown output
masteragent.log	<destination directory>\exec	Master Agent log
Mga_console	<destination directory>\exec	
Egs_sst	<destination directory>\exec\EGS500	
EGS500 <year-month-day-time>	<destination directory>\exec\EGS500	
Mnr_sst	<destination directory>\exec\MNR500	
MNR500 <year-month-day-time>	<destination directory>\exec\MNR500	

18.4. Managed object sizing

Table 1 Managed Object Sizes

Managed Object	Resource	Small	Medium	Large
<i>Symmetrix</i>	Logical volumes	1-800	801-2000	2001-8192
	Front-end mappings	1-1600	1601-4000	4001-16000
<i>CLARiiON</i>	Disks	1-60	61-80	81-120
	LUNs	1-256	257-512	513-1024
<i>NAS</i>	Logical devices	1-150	151-500	501-1200
	Data movers	2	4	10
<i>Switch</i>	Ports	1-16	17-64	65-256
<i>Oracle or DB2 database</i>	Sum of data files and tablespaces	1-800	801-1600	1601-2048
<i>SQL Server or Sybase</i>	Sum of databases, data files, log files, file groups	1-100	101-200	201-400
<i>MVS LPAR</i>	DASD devices	1-600	601-1500	1501-3000
<i>Agent host</i>	Host devices	1-16	17-128	129-512
	Logical volumes	1-16	17-64	65-128
	File systems (NTFS, UFS, VXFS, etc.)	1-16	17-64	65-128
	Redundant paths	1-2	3-4	5-32

18.5. Resource requirements of agents

Use agent resource utilization to help schedule DCPs.

The impact of an agent on system resources depends on the agent type, polling frequency, and the number and size of the MOs managed by the agent.

- ◆ For agents with polling frequencies that are less than one hour, the average *Steady State* of the agent should always remain under 1 percent when managing one medium-size managed object.
- ◆ For agents having a daily polling cycle, small spikes of resource utilization occur for a few minutes each day.

Table 13 on page 30 shows the CPU utilization for ControlCenter agent polling with one medium-size MO. These duration and average CPU usage values were determined by tests conducted on the following agent host configurations.

Note: Consider these differences in hardware configuration when using performance data for agent host comparison.

- ◆ Windows: Two 1 GHz processors with 1 GB RAM, running Windows 2000 Advanced Server.
- ◆ Solaris: Two 500 MHz processors with 2 GB RAM, running Solaris 8.
- ◆ HP-UX: One 360 MHz processor with 512 MB RAM, running HP-UX 11.0.
- ◆ AIX: Four 375 MHz processors with 4 GB of RAM, running IBM AIX 5.1.

Agent Type	Default Polling Cycles		Duration (mm:ss)	Avg. CPU Usage	Estimated Memory	Required Disk Space		
Storage Agent for Symmetrix	Alert Polling	2 Minutes	Steady State	Windows 0.22% Solaris 0.41% HP-UX 0.72% AIX 1.51% MVS 0.01%	Windows 43 MB Solaris 61 MB HP-UX 62 MB AIX 95 MB MVS 98.8 MSO SU/second	Windows 28 MB Solaris 12 MB HP-UX 22 MB AIX 33 MB		
	CLI Generation	Once daily at Midnight						
	Configuration	10 Minutes						
	Historical Data	Once daily at Midnight						
	Local Discovery	Once daily at Midnight						
	Performance Statistics	2 Minutes						
	BCV/RDF Status	5 Minutes						
	Real-time BCV/RDF Status	1 Minute						
	WLA Daily	15 Minutes	Steady State	Windows 0.72% Solaris 0.43% HP-UX 2.83% AIX 2.33% MVS 7.10%				
	WLA Revolving	2 Minutes						
Database Agent for Oracle	Discovery	Once daily at 6:00 a.m.	Windows 01:41 Solaris 01:32 HP-UX 01:37 AIX 01:30	Windows 8.05% Solaris 8.38% HP-UX 10.99% AIX 9.98%	Windows 10 MB Solaris 8 MB HP-UX 30 MB AIX 20 MB	Windows 15 MB Solaris 18 MB HP-UX 24 MB AIX 40 MB		
	WLA Daily	15 Minutes	Steady State	Windows <1.0% Solaris <1.0% HP-UX <1.0% AIX <1.0%				
	WLA Revolving	15 Minutes						
Fibre Channel Connectivity Agent	Fabric Validation	1 Hour	Steady State	Windows <1.0% Solaris <1.0% HP-UX <1.0% AIX <1.0%	Windows 30 MB Solaris 40 MB HP-UX 40 MB AIX 33 MB	Windows 21 MB Solaris 12 MB HP-UX 23 MB AIX 40 MB		
	Device Validation	1 Hour						
	WLA Daily	15 Minutes	Steady State	Windows <1.0% Solaris <1.0% HP-UX <1.0% AIX <1.0%				
	WLA Revolving	15 Minutes						
Host Agent	Discovery	Once daily at Midnight Once daily at 2:00 a.m. Once daily at 4:00 a.m. Once daily at 4:00 a.m.	Windows 06:11 Solaris 02:05 HP-UX 01:50 AIX 00:48	Windows 44.85% Solaris 27.57% HP-UX 0.72% AIX 1.36%	Windows 15 MB Solaris 27 MB HP-UX 27 MB AIX 15 MB	Windows 21 MB Solaris 13 MB HP-UX 21 MB AIX 28 MB		
	WLA Daily Collection	15 Minutes	Steady State	Windows 1.30% Solaris <1% HP-UX 1.20% AIX <1%				
	WLA Revolving Collection	2 Minutes						

Storage Agent for CLARiiON	Discovery (45 disks, 12 LUNs)	Once daily at Midnight	Windows 00:66 Solaris 01:42 AIX 02:50 HP-UX 03:13	Windows 44.4% Solaris 36.07% AIX 22.14% HP-UX 81.76%	Windows 65 MB Solaris 47 MB AIX 46MB HP-UX 55MB	Windows 12 MB Solaris 6 MB HP-UX 11 MB AIX 22 MB
	WLA Daily ^a	15 Minutes	Steady State	Windows 23.294% Solaris 13.9% AIX 21.77% HP-UX 74.55%		
	WLA Revolving	2 Minutes				
Storage Agent for HDS	Discovery (75 devices)	Once daily at Midnight	Windows 02:14 Solaris 00:28 HP-UX 02:24	Windows 2.55% Solaris 5.19% HP-UX 5.81%	Windows 10 MB Solaris 72 MB HP-UX 15.5 MB	Windows 11 MB Solaris 5 MB HP-UX 10 MB
Symmetrix SDM Agent	Discovery	12 Hours	Windows 00:22 Solaris 00:25 HP-UX 00:28 AIX 00:05	Windows 3.98% Solaris 3.89% HP-UX 2.16% AIX 1.54%	Windows 22 MB Solaris 26 MB HP-UX 26.5 MB AIX 27.5 MB	Windows 10 MB Solaris 5 MB HP-UX 10 MB AIX 18 MB
Common Mapping Agent	Host Discovery (proxy)	Once daily at Midnight	Windows 05:27 Solaris 05:24	Windows 1.78% Solaris 1.88%	Windows 30.5 MB Solaris 30 MB	Windows 12 MB Solaris 6 MB
	Informix Discovery (proxy)	Once daily at Midnight	Solaris 01:38	Solaris 0.62%	Solaris 15.5 MB	
	Sybase Discovery (proxy)	Once daily at Midnight	Solaris 04:20 HP-UX 02:51 AIX 04:25	Solaris 11.38% HP-UX 12.50% AIX 12.2%	Solaris 25 MB HP-UX 20 MB AIX 50 MB	
	SQL Server Discovery (proxy)	Once daily at Midnight	Windows 04:17	Windows 0.62%	Windows 17 MB	
	IBM UDB Discovery (proxy)	Once daily at Midnight	AIX 19:22	AIX 6.21%	AIX 17 MB	

18.6. Data size collected by agents

Table 9 Data Volumes Sent to the Store

Data Collection Policy	Approximate Data Volume
Full configuration load of a medium Symmetrix array	1 MB
Rediscovery of a medium Solaris host	1 MB
Topology validation of a medium switch	40 KB
WLA Daily policy data for a medium Symmetrix array	600 KB
WLA Daily policy data for a medium host	15 KB

18.7. Agent disk space requirements

Deploy Agents and Perform Initial Discovery

Agent	Available with These License Keys
<i>Workload Analyzer Archiver</i>	Performance Manager

Checking Agent Disk Space

Use Table 25 to calculate required disk space for agent hosts. All disk space requirements include 25 MB allocated for log files.

Table 25 ControlCenter Agent Disk Space Requirements

Agent	Windows	AIX	HP-UX	Solaris	Linux
<i>Master Agent</i>	150 MB	102 MB ^a	119 MB ^a	124 MB ^a	102 MB ^a
<i>Backup Agent for EDM</i>				5 mb	
<i>Backup Agent for LEGATO NetWorker</i>	11 mb	21 mb	11 mb	5.5 mb	
<i>Backup Agent for TSM</i>	13 mb	33 mb	29 mb	8 mb	
<i>Backup Agent for VERITAS NetBackup</i>	11 mb	21 mb	11 mb	5.5 mb	
<i>Common Mapping Agent</i>	11.9 mb			5.5 mb	
<i>Database Agent for Oracle</i>	14.5 mb	39.5 mb	24.2 mb	18.2 mb	
<i>Fibre Channel Connectivity Agent^b</i>	21 mb	40 mb	23 mb	12 mb	
<i>Host Agent for <platform> (except Novell: 9.5 MB on Windows only)</i>	21.1 mb	28 mb	21 mb	13.2 mb	28 mb
<i>Integration Gateway</i>	7.2 mb			110.5 mb	
<i>Storage Agent for Centera</i>	132.8 mb				
<i>Storage Agent for CLARiiON</i>	12 mb	22 mb	11 mb	6 mb	
<i>Storage Agent for ESS</i>	9 mb				
<i>Storage Agent for HDS</i>	11 mb	19 mb	10 mb	5 mb	
<i>Storage Agent for HP StorageWorks</i>	11 mb				
<i>Storage Agent for NAS</i>	17 mb				
<i>Storage Agent for SMI</i>	12.2 mb				
<i>Storage Agent for Symmetrix</i>	28 mb	33.4 mb	21.5 mb	12.2 mb	
<i>Solutions Enabler</i>	43 MB	106.1 MB	149 MB	112 MB	
<i>Symmetrix SDM Agent</i>	10 mb	18 mb	10 mb	5 mb	
<i>Workload Analyzer Archiver</i>	30.5 mb				

18.8. Agent acronyms, listening ports, processes, filenames

Table 31 Agent Acronyms, Listening Ports, Processes, Filenames

Agent Name	Acronym	Listening Port	Platforms	Process Name	Filename
Common Agents					
Master Agent	MGA	5798	Windows	mstragent.exe	MGA.ini
			AIX, HP-UX, Solaris	mstragent	
Common Mapping Agent	EGZ	10777	Windows	egzagent.exe	EGZ.ini
			Solaris	egzagent	

Agent Name	Acronym	Listening Port	Platforms	Process Name	Filename
Host Agent for Linux	MLR	10555	Linux	mtragent	MLR.ini
Host Agent for Novell	MVR	11013	Novell	mvragent.exe	MVR.ini
Host Agent for Solaris	MSR	10555	Solaris	msragent	MSR.ini
Host Agent for Windows	MNR	10444	Windows	mnragent	MNR.ini
Host Agent for Active Directory	MNA	11028	Windows	mnaagent	MNA
Storage Agents					
Storage Agent for NAS	CNN	10667	Windows	cnnagent.exe	CNN.ini
Storage Agent for CLARiON	MGL	11041 ^a	Windows	mglagent.exe	MGL.ini
			Solaris, HP-UX, AIX	mglagent	
Storage Agent for Centera	CGC	11042 ^b	Windows	cgcagent.exe	CGC.ini
Storage Agent for ESS	MGC	11045 ^c	Windows	mgcagent.exe	MGC.ini
Storage Agent for HP StorageWorks	MNQ	11024	Windows	mnragent.exe	MNQ.ini
Storage Agent for HDS	MND	11023	Windows	mgdagent.exe	MND.ini
	MSD	11027	Solaris	mgdagent	MSD.ini
	MHD		HP-UX		MHD.ini
	MAD		AIX		MAD.ini
Storage Agent for Symmetrix	EGS	10222	Windows	egsagent.exe	EGS.ini
			Solaris, HP-UX, AIX	egsagent	
	N/A		Supported proxy hosts	depends on platform	depends on platforms

- If the agent needs to go through a firewall to access the CLARiON, the agent requires TCP and UDP access on all access node IP addresses, in both directions, for port 6389.
- If the agent needs to go through a firewall to access the Centera, the agent requires TCP and UDP access on all access node IP addresses, in both directions, for port 3218.
- If the agent needs to go through a firewall to access the IBM ESS array, the agent requires TCP and UDP access on all access node IP addresses, in both directions, for port 443.

Connectivity Agents					
Symmetrix SDM Agent	EGF	11031	Windows	egfagent.exe	EGF.ini
			Solaris, HP-UX, AIX	egfagent	
Fibre Channel Connectivity Agent	EGN	11011	Windows	egnagent.exe	EGN.ini
			Solaris, HP-UX, AIX	egnagent	
Database Agents					
Database Agent for Oracle	EGO	10999	Windows	egoagent.exe	EGO.ini
			Solaris, HP-UX, AIX	egoagent	
Host Agents					
Host Agent for AIX	MAR	11018	AIX	maragent	MAR.ini
Host Agent for HP-UX	MHR	11021	HP-UX	mhragent	MHR.ini

18.9. DB agent User privileges

Use privileges required by the usersids that will be required to discover databases for EMC ControlCenter. (EMC doc: Userid privileges).

18.9.1. Script for Oracle user creation

Oracle DBA will create the oracle username that will be used for the oracle agent in each Oracle instance that will be discovered by Control Center. The script `maualsetup.sql` (appendix) will need to be updated with the oracle agent username and executed.

Script for Oracle user creation

Manualsetup.sql

```
--GRANT_SCRIPT_VERSION 5.14
--VIEW_SCRIPT_VER 5.2
--SCRIPT_FNAME oraagent8.sql

-- You must have sufficient privileges to create users, views and grant permissions
-- Before executing this script.

-- Step 1: replace all occurrences of OUSER with the desired oracle agent username

-- Step 2: Uncomment the following line(s) and edit as appropriate if you wish to
-- create the user with this script. This script assumes the tablespace USERS exists.
- CREATE USER OUSER IDENTIFIED BY ouser_password DEFAULT
TABLESPACE USERS
/
grant connect, create view to OUSER;
grant select on sys.v_$instance to OUSER;
grant select on sys.v_$controlfile to OUSER;
grant select on sys.v_$logfile to OUSER;
grant select on sys.v_$database to OUSER;
grant select on sys.dba_segments to OUSER;
grant select on sys.sys_objects to OUSER;
grant select on sys.obj$ to OUSER;
grant select on sys.tab$ to OUSER;
grant select on sys.user$ to OUSER;
grant select on sys.ts$ to OUSER;
grant select on sys.ind$ to OUSER;
grant select on sys.dba_data_files to OUSER;
grant select on sys.seg$ to OUSER;
grant select on sys.user$ to OUSER;
grant select on sys.tabpart$ to OUSER;
grant select on sys.indpart$ to OUSER;
```

```
grant select on sys.dba_free_space to OUSER;
grant select on sys.v_$sga to OUSER;
grant select on sys.v_$version to OUSER;
grant select on sys.v_$database to OUSER;
grant select on sys.v_$parameter to OUSER;
grant select on sys.v_$session to OUSER;
grant select on sys.dba_tables to OUSER;
grant select on sys.dba_extents to OUSER;
grant select on sys.dba_indexes to OUSER;
grant select on sys.dba_tablespaces to OUSER;
```

```
grant select on sys.v_$filestat to OUSER;
grant select on sys.v_$datafile to OUSER;
grant select on sys.v_$dbfile to OUSER;
grant select on sys.v_$session_wait to OUSER;
grant select on sys.v_$session to OUSER;
grant select on sys.v_$sqltext to OUSER;
grant select on sys.v_$log to OUSER;
grant select on sys.uet$ to OUSER;
grant select on sys.file$ to OUSER;
grant select on sys.dba_free_space_coalesced to OUSER;
grant select on sys.fet$ to OUSER;
grant select on sys.DBA_FREE_SPACE_COALESCED_TMP2 to OUSER;
grant select on sys.DBA_FREE_SPACE_COALESCED_TMP3 to OUSER;
grant select on sys.v_$sysstat to OUSER;
grant select on sys.v_$rowcache to OUSER;
grant select on sys.v_$librarycache to OUSER;
grant select on sys.v_$queue to OUSER;
grant select on sys.v_$tempfile to OUSER;
grant select on sys.v_$temp_space_header to OUSER;
/
drop table OUSER.ecc_fet
/
```

```
CREATE OR REPLACE VIEW OUSER.ecc_tablespaces (
    tablespace_name,
    owner_name,
    contents,
    status )
AS
select t.name, u.name,
decode(mod(min(t.online$), 65536), 1, 'ONLINE', 2, 'OFFLINE',
      4, 'READ ONLY', 'UNDEFINED') status,
      decode(t.contents$, 0, 'PERMANENT', 1, 'TEMPORARY') tablespaceType
from sys.seg$ s, sys.user$ u, sys.ts$ t
```

```
where t.ts#=s.ts#
and u.user#=s.user#
and t.online$ <> 3
group by t.name, u.name, t.contents$
union
select t.name, u.name,
decode(mod(t.online$, 65536), 1, 'ONLINE', 2, 'OFFLINE',
      4, 'READ ONLY', 'UNDEFINED') status,
decode(t.contents$, 0, 'PERMANENT', 1, 'TEMPORARY') tablespaceType
from sys.ts$ t, sys.user$ u
where t.owner#=u.user#
and t.online$ <> 3
/
```

```
create or replace view OUSER.ddf_view
(file_id, relative_fno, file_name, tablespace_name, total) as
select
f.file#, f.relfile#, v.name, ts.name, nvl(hc.bytes, ts.blocksize * f.blocks)
from sys.v_$dbfile v, sys.file$ f, sys.ts$ ts, sys.dba_data_files hc
where v.file# = f.file#
and f.spare1 is NOT NULL
and f.file# = hc.file_id
and f.ts# = ts.ts#
union all
select f.file#, f.relfile#, v.name, ts.name, ts.blocksize * f.blocks
from sys.file$ f, sys.ts$ ts, sys.v_$dbfile v
where v.file# = f.file#
and f.spare1 is NULL
and f.ts# = ts.ts#
union all
select f.file#, f.rfile#, f.name, ts.name, ts.blocksize * f.blocks
from sys.v_$tempfile f, sys.ts$ ts
where f.ts# = ts.ts#
/
```

```
create or replace view OUSER.dfs_view as
select tablespace_name, file_id, sum(bytes) free
from sys.dba_free_space
group by tablespace_name, file_id
union all
select tablespace_name, file_id, sum(bytes_free) free
from sys.v_$temp_space_header
group by tablespace_name, file_id
/
```

```
CREATE OR REPLACE VIEW OUSER.ecc_data_files (
```

```
file_id,
rel_file_id,
file_name,
tablespace_name,
file_size,
free_size,
percent_used,
file_type )
AS
SELECT f.file_id, f.relative_fno, file_name, f.tablespace_name, total,
       nvl(free, 0),
       decode(free, null, 100, nvl(round((((total-free)/total)*100),2), 100.0)),
'Data'
FROM   OUSER.ddf_view f, OUSER.dfs_view s
where f.TABLESPACE_NAME = s.TABLESPACE_NAME (+)
and f.file_id = s.file_id (+)
union
select 0, 0,name," , 0, 0, 0, 'Control'
from sys.v_$controlfile
union
select 0, 0, member," , bytes, 0, 0, 'Log'
from sys.v_$logfile a, sys.v_$log b
where a.group# = b.group#
/

-- View SEGMENT_VIEW

CREATE OR REPLACE VIEW OUSER.segment_view (
  segmentblocknum,
  segmentfilenum,
  segmenttype,
  schemaname,
  segmentname,
  partitionname,
  tablespacename,
  filename,
  numblocks,
  numextents,
  segmentsize,
  createtime )
AS
select 0, 0, " , " , " ,
f.tablespace_name, f.file_name, 0, 0, 0, sysdate
from sys.dba_data_files f
/
```

```
CREATE OR REPLACE VIEW OUSER.ECC_FET_TMP1_VIEW ( TS#,
FILE#,BLOCK# )
AS select TS#, FILE#,BLOCK#
from sys.fet$ a minus select TS#, FILE#,BLOCK# + LENGTH from sys.fet$ b
/
```

```
CREATE OR REPLACE VIEW OUSER.ECC_FET_VIEW ( TS#,
EXTENTS_COALESCED, BLOCKS_COALESCED ) AS
select a.ts#, count(*) extents_coalesced, sum(b.length) blocks_coalesced
from OUSER.ECC_FET_TMP1_VIEW a, sys.fet$ b
where a.ts#=b.ts# and
      a.file#=b.file# and
      a.block#=b.block#
group by a.TS#
/
```

```
CREATE OR REPLACE VIEW OUSER.ecc_fscoalesced_view (
TABLESPACE_NAME,
TOTAL_EXTENTS, EXTENTS_COALESCED,
PERCENT_EXTENTS_COALESCED, TOTAL_BYTES,
BYTES_COALESCED, TOTAL_BLOCKS, BLOCKS_COALESCED,
PERCENT_BLOCKS_COALESCED
) AS select name,total_extents, extents_coalesced,
      extents_coalesced/total_extents*100,total_blocks*c.blocksize,
      blocks_coalesced*c.blocksize, total_blocks, blocks_coalesced,
      blocks_coalesced/total_blocks*100
from OUSER.ecc_fet_view a, sys.DBA_FREE_SPACE_COALESCED_TMP2 b,
      sys.ts$ c
where a.ts#=b.ts# and a.ts#=c.ts#
union all
select name, total_extents, total_extents, 100, total_blocks*c.blocksize,
      total_blocks*c.blocksize, total_blocks, total_blocks, 100
from sys.DBA_FREE_SPACE_COALESCED_TMP3 b, sys.ts$ c
where b.ts# = c.ts#
/
```

```
CREATE OR REPLACE VIEW OUSER.ECC_TSSIZE_VIEW ( TSNAME,
TOTALKBYTE ) AS
select t.name, sum(f.blocks * t.blocksize)/1024 totalkbyte
from sys.ts$ t, sys.v_$datafile f where t.ts# = f.ts#
group by t.name, t.owner#
union all
select t.name, sum(f.blocks * f.block_size)/1024 totalkbyte
from sys.v_$tempfile f, sys.ts$ t where f.ts# = t.ts#
group by t.name, t.owner#
```

/

```
CREATE OR REPLACE VIEW OUSER.ECC_TEMP_FREE_VIEW (TSNAME,
FREEKBYTE) AS
select tablespace_name, sum(bytes_free)/1024
from sys.v_$temp_space_header
group by tablespace_name
/
```

```
CREATE OR REPLACE VIEW OUSER.ecc_tsallocation_view (
    tsname,
    tssubtype,
    oracletsid,
    ownername,
    totalextents,
    totalblocks,
    extentscoalesced,
    blockscoalesced,
    freekbyte,
    totalkbyte )
AS
select t.name, decode(t.contents$, 0, 'PERMANENT', 1, 'TEMPORARY') tssubtype,
    t.ts# oracletsid, u.NAME ownername, f.total_extents, f.total_blocks,
    f.extents_coalesced, f.blocks_coalesced,
    decode(f.total_blocks, null, m.freekbyte,(t.blocksize * f.total_blocks)/1024)
freekbyte,
    s.totalkbyte
from sys.ts$ t, OUSER.ecc_fscoalesced_view f, sys.user$ u, OUSER.ecc_tssize_view
s, OUSER.ecc_temp_free_view m
where t.name = f.tablespace_name (+) and t.name = s.tsname
    and t.owner# = u.user#
    and t.name = m.tsname(+)
/
```

```
create or replace view OUSER.ecc_segfilestats_view (
    eventname,
    owner,
    filename,
    segment_name,
    param1,
    param2,
    param3)
as
select /*+ CHOOSE */ v.event, d.owner,
REPLACE(REPLACE(REPLACE(REPLACE(f.name, CHR(13),"), CHR(10), "),
CHR(9), "), CHR(32),") name, d.segment_name, v.p1, v.p2, sum(p3) p3
```

```

from v$session_wait v, dba_extents d, v$datafile f
where v.event in ('db file scattered read','db file sequential read',
'db file single write')
and d.file_id = v.p1 and v.p1=f.file#
and (d.block_id between v.p2 and (v.p2 + v.p3))
group by v.event, d.owner, f.name, d.segment_name, v.p1, v.p2
/
CREATE OR REPLACE VIEW OUSER.EGO_SCRIPT(GRANT_SCRIPT_VER,
VIEW_SCRIPT_VER, SCRIPT_FNAME)
AS SELECT 5.14, 5.2, 'oraagent8.sql' FROM DUAL

```

18.9.2. SYBASE

The Sybase DBA will need to create the DBuser account with the following rights for each Sybase instance that will be discovered by Control Center.

need to grant 'select'

need to grant 'select', to access 'master', 'sysdatabases'.

need to grant to access all the database as well as SP sp_helpuser

need to grant 'select', to access all the databases,

to access 'sysdatabases', 'sysusages', 'sysdevices',

'spt_values', 'sysmessages'

need to grant 'select', to access all the databases,

to access 'sysobject', 'sysusers'

18.9.3. DB2/UDB

Minimum privileges required are:

Sysmaint

18.9.4. MS SQL Server

SQL DBA needs to create a userID

SQL DBA also needs to create a System DSN for ECC using the ECC userID and password and test data source.

Database vendors

Functions SQLServer

use master

select to 'sysfiles'

select to 'sysdatabases'

select to 'sysfiles', 'sysfilegroups'

select to 'sysindexes', 'sysusers',

'sysobjects', 'sysfilegroups'

select to 'sysusers', 'sysobjects'

select to 'sysfiles', 'sysfilegroups'

select to 'sysusers'

18.10. Reference Documents

- ECC Configuration Guide(s) for Citigroup
- ECC Performance and Scalability guidelines