System Automation for OS/390

General Information

Version 2 Release 1

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General Information

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Contents

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About This Book

This book provides a general overview of System Automation for OS/390®
(SA OS/390). Contents include what SA OS/390 does, the benefits it offers, and
the things you should consider when planning for its installation and operation.

Who Should Use This Book

This book is intended for data processing managers, system planners and
programmers who are responsible for product evaluation. It provides an overview
you can use to determine how to plan for SA OS/390 and how it will work in
your data processing enterprise. This book is also for those who are already using
SA OS/390 and want to upgrade to Version 2 Release 1.

How This Book Is Organized

This book is organized as follows:

- **Chapter 1. Introducing System Automation for OS/390** gives a brief overview
  of SA OS/390 and its basic functions and benefits.
- **Chapter 2. Planning for System Automation for OS/390** describes things you
  should consider when planning for SA OS/390, including installation, migration
  and customization considerations. **What's New in Version 2 – At a Glance**
  describes the new functions that were added to System Automation for OS/390
  V2R1.

Where to Find More Information

The following table gives an overview of the SA OS/390 library and shows where
to find which information:

Table 1. System Automation for OS/390 Library – Related to Tasks

Task	Information Unit
Evaluating	*System Automation for OS/390 General Information* *System Automation for OS/390 Licensed Programming Specifications*
Installing and customizing	*System Automation for OS/390 Program Directory* *System Automation for OS/390 Planning and Installation* *System Automation for OS/390 Customizing and Programming*
Operating	*System Automation for OS/390 Defining Automation Policy* *System Automation for OS/390 User's Guide* *System Automation for OS/390 Operator's Commands*
Diagnosing and programming	*System Automation for OS/390 Messages and Codes* *System Automation for OS/390 Programmer's Reference*
Automating products	*System Automation for OS/390 CICS Automation Programmer's Reference and Operator's Guide* *System Automation for OS/390 IMS Automation Programmer's Reference and Operator's Guide* *System Automation for OS/390 OPC Automation Programmer's Reference and Operator's Guide*

The System Automation for OS/390 Library

The following table shows the information units in the System Automation for OS/390 library:

Table 2. System Automation for OS/390 Library

Title	Order Number
System Automation for OS/390 General Information	GC33-7036
System Automation for OS/390 Licensed Program Specifications	SC33-7037
System Automation for OS/390 Planning and Installation	SC33-7038
System Automation for OS/390 Customizing and Programming	SC33-7035
System Automation for OS/390 Defining Automation Policy	SC33-7039
System Automation for OS/390 User's Guide	SC33-7040
System Automation for OS/390 Messages and Codes	SC33-7041
System Automation for OS/390 Operator's Commands	SC33-7042
System Automation for OS/390 Programmer's Reference	SC33-7043
System Automation for OS/390 CICS Automation Programmer's Reference and Operator's Guide	SC33-7044
System Automation for OS/390 IMS Automation Programmer's Reference and Operator's Guide	SC33-7045
System Automation for OS/390 OPC Automation Programmer's Reference and Operator's Guide	SC23-7046

The System Automation for OS/390 books (except Licensed Program Specifications) are also available on CD-ROM as part of the following collection kit:

> IBM Online Library OS/390 Collection (SK2T-6700)

This softcopy collection includes the IBM Library Reader, a program that enables you to view online documentation.

SA OS/390 Homepage

For the latest news on SA OS/390, visit the SA OS/390 homepage at http://www.s390.ibm.com/products/sa/

Related Product Information

The following table shows the books in the related product libraries that you may find useful for support of the SA OS/390 base program.

Table 3. Related Products Books

Title	Order Number
MVS/ESA MVS Configuration Program Guide and Reference	GC28-1817
MVS/ESA Planning: Dynamic I/O Configuration	GC28-1674
MVS/ESA Support for the Enterprise Systems Connection	GC28-1140
MVS/ESA Planning: APPC Management	GC28-1110
MVS/ESA Application Development Macro Reference	GC28-1822
MVS/ESA SP V5 System Commands	GC28-1442
MVS/ESA SPL Application Development Macro Reference	GC28-1857

Table 3. Related Products Books (continued)

Title	Order Number
OS/390 Hardware Configuration Definition: User's Guide	SC28-1848
OS/390 Information Roadmap	GC28-1727
OS/390 Information Transformation	GC28-1985
OS/390 Introduction and Release Guide	GC28-1725
OS/390 JES Commands Summary	GX22-0041
OS/390 Licensed Program Specifications	GC28-1728
OS/390 Printing Softcopy Books	S544-5354
OS/390 Starting Up a Sysplex	GC28-1779
OS/390 Up and Running!	GC28-1726
Planning for the 9032 Model 3 and 9033 Enterprise Systems Connection Director	SA26-6100
Resource Access Control Facility (RACF) Command Language Reference	SC28-0733
S/390 MVS Sysplex Overview – An Introduction to Data Sharing and Parallelism	GC23-1208
S/390 MVS Sysplex Systems Management	GC23-1209
S/390 Sysplex Hardware and Software Migration	GC23-1210
S/390 MVS Sysplex Application Migration	GC23-1211
S/390 Managing Your Processors	GC38-0452
Tivoli/Enterprise Console User's Guide Volume I	GC31-8334
Tivoli/Enterprise Console User's Guide Volume II	GC31-8335
Tivoli/Enterprise Console Event Integration Facility Guide	GC31-8337
Tivoli for OS/390 NetView V1R3 Administration Reference	SC31-8222
Tivoli for OS/390 NetView V1R3 Application Programmer's Guide	SC31-8223
Tivoli for OS/390 NetView V1R3 APPN Topology and Accounting Agent Guide	SC31-8224
Tivoli for OS/390 NetView V1R3 Automation Guide	SC31-8225
Tivoli for OS/390 NetView V1R3 AON Customization Guide	SC31-8662
Tivoli for OS/390 NetView V1R3 AON User's Guide	GC31–8661
Tivoli for OS/390 NetView V1R3 Bridge Implementation	SC31-8238
Tivoli for OS/390 NetView V1R3 Command Reference Vol. 1	SC31-8227
Tivoli for OS/390 NetView V1R3 Command Reference Vol. 2	SC31-8227
Tivoli for OS/390 NetView V1R3 Customization Guide	SC31-8228
Tivoli for OS/390 NetView V1R3 Customization: Using Assembler	SC31-8229
Tivoli for OS/390 NetView V1R3 Customization: Using Pipes	SC31-8248
Tivoli for OS/390 NetView V1R3 Customization: Using PL/I and C	SC31-8230
Tivoli for OS/390 NetView V1R3 Customization: Using REXX and the NetView Command List Language	SC31-8231
Tivoli for OS/390 NetView V1R3 Data Model Reference	SC31-8232
Tivoli for OS/390 NetView V1R3 Installation and Administration Guide	SC31-8236
Tivoli for OS/390 NetView V1R3 Messages and Codes	SC31-8237
Tivoli for OS/390 NetView V1R3 MultiSystem Manager User's Guide	SC31-8607

Table 3. Related Products Books (continued)

Title	Order Number
Tivoli for OS/390 NetView V1R3 NetView Graphic Monitor Facility User's Guide	GC31-8234
Tivoli for OS/390 NetView V1R3 NetView Management Console User's Guide	GC31-8665
Tivoli for OS/390 NetView V1R3 User's Guide	SC31-8241
Tivoli for OS/390 NetView V1R3 Planning Guide	GC31-8226
Tivoli for OS/390 NetView V1R3 RODM and GMFHS Programmer's Guide	SC31–8233
Tivoli for OS/390 NetView V1R3 Security Reference	SC31-8606
Tivoli for OS/390 NetView V1R3 SNA Topology Manager and APPN Accounting Manager Implementation Guide	SC31-8239
Tivoli Management Platform Reference Guide	GC31-8324
TSO/E REXX/MVS User's Guide	SC28-1882
TSO/E REXX/MVS Reference	SC28-1883
VM/XA SP GCS Command and Macro Reference	SC23-0433
VSE/SP Unattended Node Support	SC33-6412
VTAM Messages and Codes	SC31-6493
VTAM Network Implementation Guide	SC31-6404
VTAM Network Implementation Guide	SC31-6434

Chapter 1. Introducing System Automation for OS/390

System Automation for OS/390 (SA OS/390) provides you with a single point of control for a full range of systems management functions. SA OS/390 plays a key role in supplying high-end automation solutions. SA OS/390 functions lets you **monitor**, **control**, and **automate** a large range of system elements spanning both the hardware and software resources of your enterprise.

Your Enterprise

Your Information System:
Processors, Software,
I/O Devices, Coupling Facility

Operating Systems:
OS/390, MVS, VM, VSE, TPF

Software Resources:
RMF ISPF JES SDSF OPC CICS
TSO IMS ACF/VTAM RACF DB2
LOGREC SYSLOG JES SPOOL
...

NetView

SA OS/390

Panels and Windows
Automation Commands
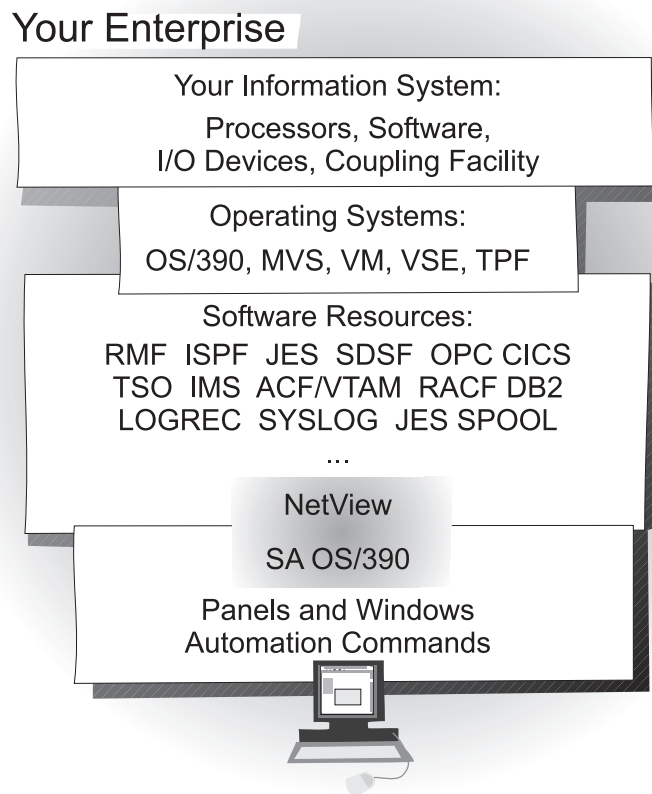
Figure 1. Your Enterprise

SA OS/390 provides you with integrated and consistent customization, maintenance, product documentation, workstation windows, and automation. In this book we will discuss some of the functions and capabilities of SA OS/390, and how they can help you manage the operations of your data processing enterprise.

Resource Monitoring

A program that monitors resources in a complex environment needs to use the system's capabilities to capture the vast quantities of available information. This information must then be presented to the operations staff in a simple, easy-to-use format that allows for quick and efficient notification and access to appropriate diagnostic tools. SA OS/390 provides this type of effective monitoring and reporting for the following resources of your system:

- Processors and logical partitions
- Operating systems
- Coupling facilities and sysplex timers
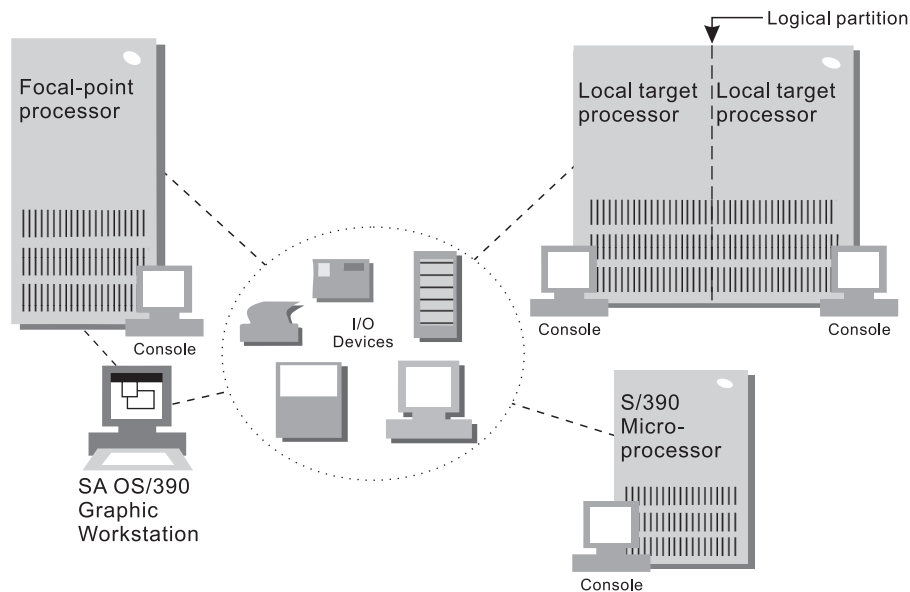- Subsystems and applications

Logical partition

Focal-point
processor

Local target
processor

Local target
processor

I/O
Devices

Console

Console

Console

SA OS/390
Graphic
Workstation

S/390
Micro-
processor

Console

Figure 2. System Resources

To perform all these tasks SA OS/390 relies on three powerful pillars: system operations, I/O operations, and processor operations.

- **System operations** monitor and control system operations applications and subsystems. System operations let you automate single systems. In Version 2 of SA OS/390 the automation scope extends to parallel sysplex applications. System operations now automate applications that are distributed over a sysplex, thus virtually removing system boundaries. System operations reduce the complexity of managing systems through goal-driven automation and concepts like grouping and powerful dependency support, which enable you to model your configuration. With system operations you can:
  - Start and control the automation of applications and subsystems on target systems
  - Automate many repetitive and complex tasks
  - Monitor automated processes, messages, and alerts
  - Take advantage of using the NMC-based graphical monitoring facilities

  By automating operator functions and monitoring the operational status of the enterprise, system operations improves system and resource availability.

  System operations extends the capacity for system growth by:
  - Consolidating operator responsibilities
  - Centralizing policy definition
  - Providing a structured operations environment, where responses to events are standardized and available for management review
- **I/O operations** help you manage your system I/O configuration. I/O operations can coordinate connectivity changes to ESCON® Directors and manage configurations saved at ESCON Directors. I/O operations can control devices

and channels across multiple systems, and retrieve and display configuration information unified from multiple systems. The information I/O operations receives is used to display system configurations at the system console, in interactive system productivity facility (ISPF) matrix displays.

One important feature of I/O operations is that it provides system-integrated switching. System-integrated switching is a safeguard that protects the critical resources of your system from being removed. Before sending the control commands that change the connectivity of dynamic switches, CHPIDs, or devices, I/O operations poll the potentially affected operating systems. If the operating system approves of the connectivity change, I/O operations send the command for processing. If the command would remove an allocated or accessed resource, or remove the last path to a device in use, I/O operations protects the resource by not processing the command.

- **Processor operations** work in combination with system operations to provide the ability to initialize, configure, recover, and shut down systems, and to monitor multiple systems and respond to a variety of detected conditions. When using processor operations, you designate one processor to control your complex. This is called the focal-point system. Each system that the processor operations focal-point system manages is called a target system. The focal-point system can:
  - Load target systems
  - Configure target systems
  - Coordinate interdependent processes across systems
  - Supervise processes requiring action on multiple systems
  - Act as the central point of control for automated console operations on target systems

With processor operations, you can greatly reduce the need for operator involvement in the operation of systems. For example, processor operations provides automation of the initial program load (IPL) process. It enables you to define additional automation to handle situations in which operator intervention is not desired. Processor operations enable your operators to manage more systems, increase system efficiency and usage, and reduce the chance of operator error. You can also increase the operator's efficiency by automating message-handling.

SA OS/390 processor operations support target system monitoring and control functions for any of the following processors: 9672, 9674, Multiprise® 2000, Application Starter Pak 3000, 9121, 9021, 4381, 3090™ and 308x. SA OS/390 processor operations also support logical partitioning of any of these processors that also support it.

A New Concept for Automation

Operating a data-processing enterprise becomes more complex as the use of technology increases. Multiple systems and large networks add even more complexity to data-center operations. As systems and resources grow in numbers and usage, the demands on them also grow. This places an increasing demand on operators and system programmers.

To tackle these manifold requirements SA OS/390 Version 2 introduces a new automation solution. For each sysplex there is now one **automation manager**. And for each system in your sysplex there is one **automation agent**.

The **automation manager** provides one central point of bookkeeping that holds all the relevant information about all the resources in the sysplex, for example:

- The statuses of the resources
- How the resources are grouped
- The "goal" of a resource, that is, when a resource should be up or down
- The dependencies between the resources

The automation manager gathers the information that is fed back from the automation agents, interprets it and takes all necessary actions, thus granting what is defined in the automation policy database. For example, the availability of certain applications during certain time windows.

The **automation agents** carry out the requests that the automation manager propagates. The agents watch what is going on in their system and report this back to the manager, for example, the status change of a system. The agents are also responsible for:

- Message processing
- Recovery processing

It is this new automation manager and agent concept that allows for cross-system automation, including cross-system dependencies, thus removing system boundaries. You could say, the automation manager acts like a "control tower", whereas the agents act as executors of the decisions made by the automation manager.

Figure 3 depicts the correlation of automation manager and agents, in which the manager holds a superior knowledge of the hierarchy between the various components:
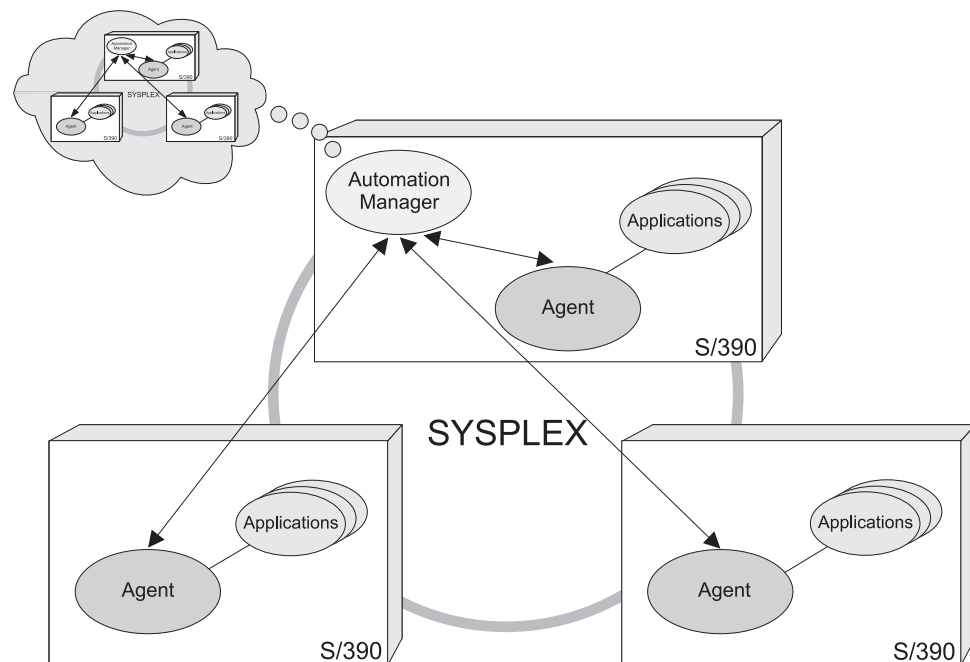

Figure 3. Correlation of Automation Manager and Agents

For further information about the automation manager and agents refer to *System Automation for OS/390 User's Guide*.

Monitoring

Passive monitoring receives information from system messages, alerts, notifications, and automatic restart requests. These can cause updates to resource status displays.

Resource, or active monitoring, also checks and compares, at regular user-defined intervals, the resource automation status that it receives from systems and resources within the SA OS/390 enterprise, with the desired resource status as specified in your automation policy. This helps to spot potential problems before they occur, which improves system and resource availability. The data SA OS/390 receives from resource monitoring can be used to trigger event-based automation. Individual monitoring granularity allows for monitoring critical resources more often than others.

Heartbeat monitoring is the method by which SA OS/390 actually monitors its monitoring function. SA OS/390 validates the status of forwarding paths by sending an alert, called the heartbeat alert, from each remote system at regular intervals. Upon receiving the heartbeat from a remote system, SA OS/390 knows that the forwarding path is operational, therefore the status of the resources associated with that system is current. If the heartbeat is not received during a designated waiting period, SA OS/390 changes the status of all resources associated with that system to Unknown, because SA OS/390 is no longer able to receive status updates for those resources. All this information is shown on the NetView® Management Console (NMC), briefly described in "Using Graphical Displays".

Using Graphical Displays

When the operator is monitoring from the graphical workstation, SA OS/390 uses icons to represent systems and resources. These icons change colors when appropriate to indicate status changes. The operator would then be alerted to the problem and proceed with normal problem determination procedures.

SA OS/390 stores its resource status information in the Resource Object Data Manager (RODM). This data can then be viewed with the NetView Management Console (NMC), briefly described in the following.

SA OS/390 Version 2 uses the NetView Management Console (NMC) for monitoring resources. With this graphical user interface (GUI) you gain greater flexibility to adapt the graphical monitoring to your needs. NMC lets you display comprehensive system and application information including dependencies, and has the following benefits:

- Ease of use through context-sensitive command menus
- Flexibility through user-defined views
- One tool (NMC) for both network and system management
- Exception views

NMC provides exception views in addition to views that show relationships of resources as shown in Figure 4 on page 6. Exception views are useful if you want to display resources that have certain properties in common, for example, all resources that are in an exception state and are marked by an operator.

Whenever the status of a displayed resource changes, NMC dynamically and automatically refreshes the data without the operator having to worry about it.

Your NMC workstation visualizes what is automated for system operations as well as for processor operations.

SS7.AOC7.APL.
JES2JSHP Available

SS7.AOC7.APL.
VTAMJSHP Available

SS7.AOC7.APG.
CICSGRPJSHP
Available

Figure 4. Operator View for Resources

If you want to know which applications belong to an application group, just click on that application group. NMC then displays a subview showing all members of the application group.

Resource Control

Once SA OS/390 monitoring detects a condition requiring some action, resource control or automation may be the next logical step in the overall task of systems management. SA OS/390 provides functions to control all the hardware and software resources that it monitors through the use of several interfaces. The SA OS/390 interfaces can be categorized as **user interfaces** and **programming interfaces**.

User Interfaces

User interfaces allow the operator to monitor and control the various hardware and software resources of the enterprise. The user interfaces include the:
- NetView console
- Graphical workstation
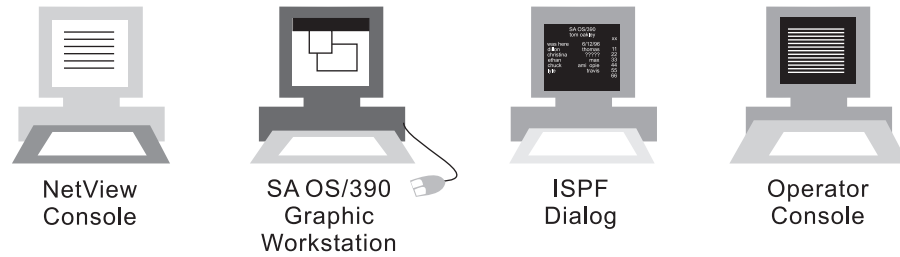- ISPF dialog
- Operator console

Figure 5. SA OS/390 User Interfaces

The **NetView console** can be used to initialize, configure, recover, shut down systems, and respond to a variety of detected conditions.

The **graphical workstation** provides the basis for monitoring, and allows the operator to control the resources of the enterprise from a graphical representation.

The **ISPF dialog** consists of a set of panels shipped with the SA OS/390 program. You can customize SA OS/390 and enter I/O connectivity commands using the ISPF dialogs.

The **operator console** allows the operator to communicate with the system and enter resource control commands.

SA OS/390 comprises comprehensive **sysplex** and **single system image** support. With this capability, operating multiple systems is now no more complex than managing single systems. The systems in the sysplex need not be controlled separately but one system in the sysplex acts as a single system image from where you can:

- View the resources of the entire sysplex
- Automate the resources
- Display the status of resources
- Control and manage the resources

All this without having to know where in the sysplex a specific resource resides. Support of single system image thus helps to optimize operating tasks and improves productivity.

The single point of control (SPOC) support extends to **enterprise images** and lets you view, control, and manage the resources of an entire enterprise with any combination of single systems or sysplexes.

Programming Interfaces

Programming interfaces allow access to system functions and services through user-written, or customizable, programs or EXECs. The intended programming interfaces supported by SA OS/390 include:

- System operations and processor operations commands defined to NetView
- Application Programming Interface (API)

System operations and processor operations commands defined to NetView can also be used as SA OS/390 programming interfaces. When defined to NetView, system operations commands can be used in conjunction with a subset of processor operations commands to perform such functions as detecting and responding to system messages, performing power-on resets and IPLs,

synchronizing clocks and shutting down target systems. For more information about implementing these capabilities, refer to *System Automation for OS/390 Operator's Commands*.

The **Application Programming Interface** supports user-written REXX EXECs and programs that adhere to the Assembler Language CALL macro interface conventions supported by OS/390. The API provides facilities that enable you to control system I/O resources and extend automation functions through the use of REXX EXECs, NetView CLISTs, and user-written automation procedures. For more information about the API, refer to *System Automation for OS/390 Programmer's Reference*.

Resource Automation

SA OS/390 automation facilities let you automate many of the repetitive and complex tasks associated with maintaining the availability of the resources in your enterprise. The resources available for automation procedures include all the hardware and software system elements that can be monitored and controlled.

Hardware Automation

Automating availability of hardware system resources includes detection of, and acting upon, exception conditions and availability requirements. I/O resource needs may be different for each system, depending on the tasks being performed and the different requirements of different shifts of operations.

SA OS/390 allows you to program automation for maintaining the availability of all hardware resources defined to it, including:
• Processors and logical partitions (LPARs)
• Channels (ESCON, parallel, etc.)
• ESCON Directors and their ports
• Control units
• I/O devices (tape, DASD, printers, etc.)
• Sysplex objects (coupling facilities, ETRs, etc.)

Automation of hardware resource availability can be implemented in much the same way as automation of software resource availability. These automation functions can be accessed through user-written routines, programs, and EXECs, and through the enhancement of the automation capabilities of the NetView program.

Application Automation

Every data processing enterprise is different, with different functions and different requirements. To add to the complexity of maintaining availability of those applications, many of them are interdependent. For example, because TSO/E depends on VTAM®, TSO/E cannot be initialized until VTAM is running. In a similar way, shutting down VTAM also shuts down TSO/E regardless of whether TSO/E is ready to be shut down. More complicated examples would involve software resources that have more than one dependency.

To effectively automate the controlled startup and shutdown of software resources, SA OS/390 provides the **transitional automation** function. At the highest level, transitional automation allows for the automated IPL of systems, including SA OS/390 itself, and coupling facilities. Transitional automation is also responsible for the orderly initialization, start, restart, shutdown, and recovery of any software resource defined to it, including:

- ACF/VTAM®
- APPC
- DB2®
- JES2
- JES3
- NetView
- OPC/ESA
- RMF™
- RODM
- TSO/E

Some of the features of transitional automation are:

- **Controlled startup.** An application is started when the other resources and conditions that it depends on become available. The policy you define for the controlled startup includes all required commands for startup, and any secondary conditions under which the application should not be started.

  Operators and automation can choose or preset application startup types, for example, hot, cold, or any other start type.

  For more information about defining policies, refer to "Customization Dialogs" on page 14.

- **Controlled shutdown.** SA OS/390 also responds to shutdown requests for applications. Any other applications requiring the application are shut down first. Your predetermined shutdown policy can define a multiple-pass structure for the shutdown commands.

- **Automated Recovery.** If an application experiences an error, SA OS/390 attempts to recover from the situation as your policy defines. Recovery can include issuing commands or replies to a message, and restarting the application if it has abended. You can also specify selective conditions and thresholds under which SA OS/390 does not attempt to recover an abended application.

  SA OS/390 recovery procedures can be coordinated with OS/390 automatic restart management function, to ensure that there is no contention between recovery procedures.

Another type of software automation provided by SA OS/390 is **steady state automation**. Steady state automation refers to the routine monitoring, both for presence and performance, of subsystems, applications, volumes, systems, and other resources. It also includes the automated recovery of resources, for example, OS/390 system data sets.

These automation functions of SA OS/390 provide an enterprise-wide solution for the automation of both S/390® hardware and software resources.

Optimizing the availability of applications when they are needed is an important issue in data processing. SA OS/390 enables you to define the availability of resources to best meet your company's needs with the following set of functions:

- **Service periods** are a set of time intervals that consist of several *service windows* for which you define whether an application should be available or unavailable.

- **Events** and **triggers** contain conditions that need to be satisfied before the starting or stopping of an application, for example, that a certain application needs to be backed up before it can be started.

Exploiting these facilities enhances your applications' availability. And it saves time by automating recurring tasks and lets operators focus on other work.

Application automation is enhanced in Version 2 with the following capabilities:
- Goal-driven automation
- Grouping of applications
- Start and stop dependencies
- Application move

For a brief description of these enhancements, refer to "What's New in Version 2 – At a Glance" on page 15.

Product Automation

System Automation for OS/390 Version 2 includes the following automation capabilities:

- **Customer Information Control System (CICS)**, to allow automation to start and stop CICS®, to monitor and control local and remote CICS regions, to monitor and recover interregion and intersystem communications, and to monitor CICS applications. CICS Automation thus helps you standardize startup, shutdown, and recovery procedures and also offers link monitoring and health checking.
- **Information Management System (IMS)**, to provide a single point of control for multiple IMS regions in XRF and non-XRF environments, to provide message and state/action pair automation, and to support operator access to most master terminal operator functions. IMS Automation helps you automate startup, shutdown, and recovery of IMS subsystems.
- **Operations, Planning and Control (OPC)**, to tie OPC's sophisticated calendar capabilities to SA OS/390 and exploit it to control the NetView environment, and to allow the automation of normal operation and recovery of OPC itself.
- **IBM DATABASE 2™ (DB2)**, to provide special start and stop functions for administrative purposes and to allow for monitoring connections and critical events. DB2 Automation lets you start DB2 in a non-standard mode and also provides the ability to stop or start a specific Tablespace. DB2 Automation also allows for stopping threads attached to DB2 in order to free DB2 to perform special other tasks.

All four of these automating functions provide NetView host-based user interfaces.

Chapter 2. Planning for System Automation for OS/390

As an OS/390 application, SA OS/390 uses the System Modification Program/Extended (SMP/E) program to install the SA OS/390 program on the host. The SMP/E phase of SA OS/390 installation is described in the *System Automation for OS/390 Program Directory*, which is delivered with the product. The post-SMP/E phase of SA OS/390 installation consists of a set of tasks, which include:
- Setting up the customization dialogs
- Setting up SA OS/390 automation
- Installing the graphical workstation
- Customizing SA OS/390 for your enterprise using the customization dialogs

For specific instructions about all post-SMP/E installation tasks, refer to *System Automation for OS/390 Planning and Installation* where a step-by-step description is provided to help you install SA OS/390.

Hardware Requirements

The following are the minimum hardware requirements for the SA OS/390 host-based program and the SA OS/390 workstation components.

Host-based Program

SA OS/390 operates on any IBM ESCON-capable processor that is supported by OS/390 V2R6 or higher (with either JES2 or JES3).

SA OS/390 provides a wide range of I/O configuration information and control functions for various types of hardware other than processors, though it does not require any of them. The hardware can include channels, control units and devices (both ESCON and non-ESCON), ESCON Directors (they are not required), and hardware used for sysplex coordination such as coupling facilities and External Time Reference (ETR) devices.

Workstation Components

SA OS/390 operator's workstation component operates on any workstation supported by the NetView Management Console (NMC).

Communications Requirements

SA OS/390 uses the following communication vehicles for system operation functions:
- XCF for the communication between automation agents within the same sysplex
- MQSeries for the communication between an automation agent and automation manager
- NetView-based communication functions for the communication between automation agents residing in different sysplexes

The host-to-host communication between the various instances of I/O operations is done by means of ACF/VTAM. This is independent of any NetView communication that might exist between the same hosts.

SA OS/390 requires the following for communications from a focal-point system to a target system for processor operations functions:

- For non-screen-oriented processors (System/390 microprocessors), the system console function is supported by a NetView connection from the S/390 microprocessor support element directly to the focal-point system.
- For screen-oriented processors, SA OS/390 requires a workstation for communication from the focal point to the target system. The connection between the workstation and the focal-point system requires an SNA controller, which can be attached to the focal-point system by channel or telecommunications links. The channel or communication links are supported by ACF/VTAM as an LU 6.2 connection, which can be local, leased-line remote, or switched-line remote. The workstation connects to a target system through the existing system console or a control unit.

SA OS/390 processor operations also uses Advanced Program-to-Program Communications (APPC) to communicate between the operator's workstation and the processor-attached workstations.

Software Requirements

Table 4 shows the minimum software requirements for the SA OS/390 host-based program and the SA OS/390 workstation components.

Table 4. Mandatory Requisites

Program Number	Product Name and Minimum VRM/Service Level
5647–A01	OS/390 Version 2 Release 6 or higher
5697–B82	Tivoli® NetView 1.3
5655–A95	MQSeries® for OS/390 Version 2.1

Table 5 shows the functional requisites needed for run time for specific functions of SA OS/390 to work:

Table 5. Functional Requisites

Program Number	Product Name and Minimum VRM/Service Level	Function
The SA OS/390 host component exploits as optional prerequisites:		
5647-A01	OS/390 Version 2 Release 6 or 7	For single system automation with certain OpenEdition® restrictions.
5647-A01	OS/390 Version 2 Release 8	For single system automation with certain OpenEdition considerations.
5647-A01	OS/390 Version 2 Release 9 or higher	For sysplex automation with certain OpenEdition considerations.
OS/390 base elements or optional features:		
	Security Server (root: RACF V2R2 and OpenEdition DCE Security Server), optional feature in OS/390 V2R6	For sysplex-based authorization and RACF-based NetView authorization.
Other program products:		
5688-015	BookMaster® Release 4.0	For customization reports.
5655-A95	MQSeries 2.1	For single system automation.
5655-A95	MQSeries 2.2	For sysplex automation.

Table 5. Functional Requisites (continued)

Program Number	Product Name and Minimum VRM/Service Level	Function
5697–B83	Tivoli Enterprise Console (TEC) 2.6, and Tivoli Global Enterprise Manager (GEM), or equivalent Tivoli OS/390 event integration services.	For TEC Notification by SA OS/390.
Workstation Requirements:		
	Tivoli NetView for OS/390 Release 3 MultiSystem Manager	For SA OS/390 topology manager functions.
	NetView Management Console Server and Client NetView 3270 Management Console	For the NMC workstation.
5639-F93	OS/2® Warp Server for e-business	Processor operations PC
5622-981	Personal Communications/3270 Version 4.2 for OS/2 with Access Feature	APPC functions used by LAN passthru and processor operations PC

Migrating to SA OS/390

The following examines the considerations for migrating to SA OS/390, including:
- Migrating from prior products to SA OS/390
- Coexistence of prior products with SA OS/390
- Coexistence of automation features with SA OS/390

Migrating from Prior Products to SA OS/390

You can migrate from any currently-supported level of the predecessor products to SA OS/390. The following are some considerations for migration:

- The TSCF and AOC/MVS definitions provided through those products' customization dialogs can be migrated to SA OS/390 by using its integrated customization dialogs. Refer to *System Automation for OS/390 Defining Automation Policy* for specific details.

- For information on how to migrate from System Automation for OS/390 1.2, or 1.3 to System Automation for OS/390 Version 2, refer to *System Automation for OS/390 Planning and Installation*.

- The processor operations PC must be upgraded to the current SA OS/390 level for full function, but can operate at the latest service level of former releases during migration.

It is recommended to start migration with the customization dialogs. SA OS/390 Version 2 offers an automatic conversion of the policy database of former Releases to the new format thus enabling a fast start. New comprehensive migration support allows for smooth and swift migration.

For more information about migration considerations, refer to *System Automation for OS/390 Planning and Installation* and to *System Automation for OS/390 Defining Automation Policy*.

Coexistence of Prior Products or Releases with SA OS/390 V2R1

The following shows information about coexistence of prior products or releases with SA OS/390 Version 2:

- SA OS/390 V2R1 system operations tolerates multiple levels of SA OS/390 running on different systems in enterprise.
  - In order to exploit the single point of control (SPOC) function, the system must run on SA OS/390 V1R3, or higher.
  - An automation control file resulting from an SA OS/390 V2R1 build can be used by an SA OS/390 V1R3 system.
  - The NMC focal point must have SA OS/390 V2R1 installed in order to update RODM and the NMC display accordingly. The SA OS/390 topology manager running on the focal point can communicate with SA OS/390 V1R3.
- SA OS/390 V2R1 I/O operations operating on one host can communicate with previous releases of SA OS/390 or its predecessor product ESCON Manager operating on other hosts.
- Because processor operations is installed only on the processor operations focal-point system, coexistence with other levels of processor operations is not required.

  The Distributed Function code of a processor operations PC must be at the current SA OS/390 level for full function, but SA OS/390 can communicate with the workstation if it is at the service level of the former release of SA OS/390.

Customizing SA OS/390

When discussing customizing SA OS/390, we are referring to the customization dialogs provided by SA OS/390 that allow you to tailor the monitoring, control, and automation functions to suit the specific needs of your enterprise.

Customization Dialogs

Before discussing how to use SA OS/390's customization dialogs, it is important to understand the concept of a *policy*.

In SA OS/390, a policy is the means by which you describe the systems of an enterprise and their relationships and resources. This is done so that the status of systems and resources can be monitored and automation procedures applied. The policy database is an OS/390-partitioned data set containing the policy data of your enterprise. It is this policy data that directs the automation programming to ensure that the operating procedures for your enterprise are carried out correctly and consistently.

The SA OS/390 enterprise is divided into components that correspond to the resources to be monitored or automated. Each major component of the enterprise is described in the customization dialogs by a policy object. These policy objects form the basis by which you:
- Build a description of your enterprise
- Apply monitoring and automation policy

The customization dialogs are a set of panels that run under the Interactive System Productivity Facility (ISPF) Dialog Manager and are used to:
- Define automation policy
- Define the automation environment
- Build the automation control file, the automation manager configuration file, and the processor operations control file

You define and build automation policy on the SA OS/390 configuration
focal-point system. From there the automation policy gets distributed to the
systems and sysplexes that you want to automate.

The combined definitions of all of the resources are called an *enterprise definition*.
SA OS/390 enterprise definition data entered in the customization dialog is stored
in an SA OS/390 data set called the *policy database*. You can define more than one
enterprise – each with its own policy database. SA OS/390 delivers sample policy
databases.

The enhanced customization dialogs of Version 2 have more ISPF standard
functions and, for faster navigation, shortcuts and stacked commands. Policy input
fields have been increased in length to allow for specifying more complex
commands.

The customization dialogs allow for multi–user access to the policy database for
applications and for application groups. To improve the ease–of–use for updates of
the policy database for applications, changes to the policies of applications can be
done in parallel by various automation administrators. Thus, the customization
dialogs provide you with an efficient means to address the necessary policies,
definitions and relationships within your enterprise. For specific information about
how to use the SA OS/390 customization dialogs, refer to *System Automation for
OS/390 Defining Automation Policy*.

What's New in Version 2 – At a Glance

The following major enhancements are now available in SA OS/390 Version 2:
- Goal-driven automation
- Grouping of applications
- Start and stop dependencies

Introducing Goal-Driven Automation

An important concept in SA OS/390 Version 2 is to distinguish between the *desired*
state of an application, for example 'available', and the *current* state of an
application. The desired state, which is also called the automation goal, can be
different from the current state, for example, an application whose state is running
(available) can actually be down, and vice versa. SA OS/390 aims to keep the
desired and the current state synchronous whenever possible.

To determine whether or not this is possible, the SA OS/390 automation manager
takes into account all its information, such as:
- The status of the resource
- Dependencies between resources
- The location of the resource

Then the automation manager decides how and when to make a resource available
or unavailable. This goal-driven automation simplifies operations: the operators
just specify what they want, and the automation takes care of any dependencies
and possible conflicts between goals. Even better is that this is done across systems
in a sysplex as described in "A New Concept for Automation" on page 3.
SA OS/390 thus helps you master complex resource dependencies and automate
Parallel Sysplex® applications as a whole, no matter how many resources they
consist of and no matter where they are in the sysplex.

Managing Your Application Groups More Smoothly

Modern applications often consist of more than one component, and these various components can be distributed over different systems. SA OS/390 provides the possibility to combine different components of an application on one or more systems within a sysplex into an *application group*. Application groups let you, for example:

- Monitor and control a complex application by a single command
- Integrate the application group into automation as an entity
- Schedule an application group to become automatically available at a given time. A standard application group will only be considered available if *all* applications that are members of the group are available. However, the operator need not manually interfere, because SA OS/390 takes all the necessary actions to establish conditions that grant the availability.

Exploiting Start And Stop Dependencies

One central task of SA OS/390, when starting or stopping a resource, is to consider the dependencies that exist between the resource to be started or stopped, and other resources. Certain resources can only be started when certain other resources are in a state satisfying the start dependency, for example, are already running. And certain other resources can only be stopped when certain resources are already in a state satisfying the stop dependency, for example, are already down.

These dependencies are defined in the policy database. Exploiting the dependency concept ensures that if, for example, application A can only be started if application B and C are already running, these conditions are met. Dependencies are now much more flexible because there are more dependency types. Also, start and stop types are now independent from each other. This grants that required applications are started in the right order as quickly as possible and are shut down without operator action.

Other Enhancements

Furthermore, in Version 2 of System Automation for OS/390, the following enhancements are introduced:

- **Moving applications** from one system to another. In SA OS/390 you can easily stop an active set of resources and start another one instead. This is useful for workload management. You can either perform planned (scheduled) moves, which are defined in the automation policy, where the availability of resources is automatically ensured due to defined availability goals. Or you can perform immediate moves in cases of emergency, for example, moving an application group to a backup system.
- **Flexible start commands.** You can define several command sequences that are executed if an application requires a certain start type under certain circumstances (cold start, warm start, or recovery start). By issuing a command you specify which command sequence is to be executed.
- **Performance enhancements.** Performance is considerably improved in Version 2, for example, though introducing an enhanced ACF load. The build of the automation control file is significantly faster now, and the ACF REFRESH no longer disrupts automation.
- **CICS, IMS, and OPC automation** are now integrated in the base product and the automation policy definitions can be done through the customization dialogs. Functions like startup types, grouping support for application groups, and service periods and triggers are therefore also supported now.

- **New graphical user interface (GUI).** SA OS/390 Version 2 uses the NetView Management Console (NMC), which is faster and easier to implement and grants a user-friendly visual representation of automation of system operations, and processor operations. See "Using Graphical Displays" on page 5 for more detail.
- **Improved customization dialogs** provide better navigation through shortcuts and stacked commands. See "Customization Dialogs" on page 14 for more detail.
- **TEC notification** by SA OS/390. In cases where SA OS/390 is run with Tivoli, SA OS/390 notifies the Tivoli Enterprise™ Console (TEC) whenever messages and alerts are issued that indicate critical situations. All these messages are forwarded by SA OS/390 to the TEC event server. Thus, an operator can use TEC as a single point of control for monitoring and handling events, from both the distributed environment and from SA OS/390 application.

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System Automation for OS/390
General Information
Version 2 Release 1

Publication No. GC33-7036-00

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Program Number: 5645-006

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System Automation for OS/390   **General Information**

Version 2 Release 1   GC33-7036-00