Using VTAM Generic Resources with IMS

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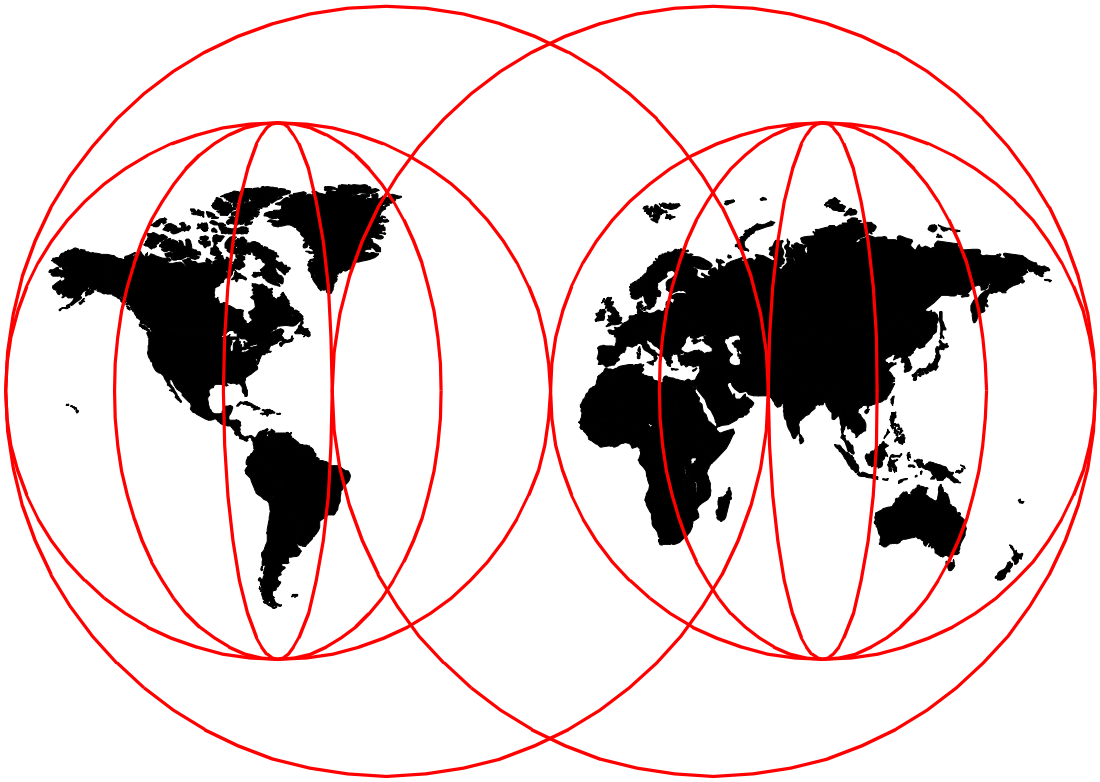

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SG24-5487-00

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SG24-5487-00

Using VTAM Generic Resources with IMS

November 1999

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix A, “Special Notices” on page 65.

First Edition (November 1999)

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Preface

This redbook provides a discussion of the use of VTAM Generic Resources (VGR) in an IMS environment.

This redbook will help you install, tailor and configure the use of VGR in IMS. Using generic resources in a sysplex environment provides greater flexibility in defining resources and the interconnection of the resources.

VGR is all about increasing availability to the end-user in the event of a failure scenario. Its ease of use and dynamic workload balancing allows for better exploitation of Parallel Sysplex features, resulting in a single view being presented to the end-user.

This book will discuss the use of generic resources and how IMS and VTAM will coordinate the use of those resources. It will explain the effect of failures upon application sessions across the network or IMS.

The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization San Jose Center.

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Chapter 1. Introducing VTAM Generic Resources for IMS

In today's world of increasing application workloads, with a more concerted drive towards continuous operations, business competitiveness and client service can be aided by constantly improving service levels. Transaction response times need to be maintained and improved upon while operating (or moving towards operating) a 24 by 7 online environment.

VTAM Generic Resources (VGR) is all about increasing availability to the end-user in the event of a failure scenario. The ease of use and dynamic workload balancing allows for better exploitation of Parallel Sysplex features, resulting in a single view being presented to the end-user.

The Parallel Sysplex environment is an implementation of hardware and software features that is implemented in such a way as to allow access to any one of the different Logical Partitions (LPARs) that make up the sysplex. These different LPARs share data and workload. They may be set up in such a way as to take over from each other in case of failure. Features within IMS that can exploit (or enhance) the sysplex environment are data sharing, Shared Queues, making use of VGR, and using Extended Terminal Option (ETO).

In a Parallel Sysplex environment it is possible, with VGR, to allow the end user a generic logon to IMS. The user is presented with a single view of all IMS systems in the sysplex. VGR determines the destination IMS, based on existing relationship information, availability, workload, and/or user-defined criteria such as those specified in a user exit.

With such a generic logon, availability, from the perspective of a user logging on, is vastly improved. Those users involved in an IMS session failure need to sign on again and, in most cases, VGR then routes them to another IMS in the same VGR group. In some instances, a significant relationship, such as a conversational status or a response mode, may remain between IMS and the user terminal. This would prevent sign-on to a generic resource, but logging on directly to an available IMS's logon APPLID can be used to override any VGR relationship management.

With VGR, session destinations can be determined by using MVS Workload Manager (WLM) or VTAM's Session Balancing (maintaining an equal number of sessions across VTAM APPLIDs — this would include the number of direct-logon sessions). An exit in VTAM allows the user more control (choosing whether to accept either WLM or VTAM's selections, or base the selection on user-defined criteria (such as those based on naming standards) over session destination determination.

In this chapter, after a short description of a Parallel Sysplex (as it pertains to IMS), we will briefly discuss the above-mentioned IMS features. This will be followed by a discussion of various example scenarios depicting the use of VGR in an IMS environment.

1.1 Parallel Sysplex

A Parallel Sysplex is an implementation of hardware and software features in such a way that data processing, and the data being processed, is shared

between LPARs. Different IMS systems, whether on separate machines or not, have concurrent access to the shared data resources (databases).

In a sysplex environment the Coupling Facility is the link between various LPAR's and/or subsystems. Any VTAM application using the VTAM Advanced Peer-to-Peer Networking (APPN) protocol and connected to an MVS coupling facility structure specified in VTAM (default name ISTGENERIC), can be known (connected to) by a generic resource name.

1.2 Data Sharing

Databases (both IMS and DB2) ideally should be defined as being shared in a sysplex environment. This allows concurrent access from all IMS systems in the Parallel Sysplex.

The advantage of such a setup is that all business processes can be performed on any of the IMS systems (which have been set up for that purpose) in the sysplex. One IMS (or multiple IMS systems) can take on the workload of another in case of an outage, and at the same time, the processing requirements can be balanced between different IMS systems by making use of Shared Queues for message delivery.

In this scenario the user does not need to know which IMS to sign on to. A generic logon, to whichever IMS is best able to handle additional load at the time, will suffice.

There are a few other redbooks with information on data sharing in a sysplex environment which contain related information:

- *IMS/ESA V6 Parallel Sysplex Migration Planning Guide for IMS TM and DBCTL*, SG24-5461.
- *IMS/ESA Data Sharing in a Parallel Sysplex*, SG24-4303.
- *IMS/ESA Sysplex Data Sharing: An Implementation Case Study*, SG24-4831.

1.3 Shared Queues

The Shared Queues facility was introduced with IMS Version 6. This facility allows all different IMS systems in the sysplex to share a common set of message or EMH queues. This allows both Full Function and Fast Path input messages to be processed on any IMS system that has access to the Shared Queue and is capable of processing the message.

Any output message (Fast Path or Full Function) can be processed by any of the IMS systems in the sysplex, provided that a session with the destination terminal has been established. In case of an IMS outage, the IMS user can sign on to another IMS and retrieve the waiting output.

There are a few other redbooks which contain related information on Shared Queues:

- *IMS/ESA Version 6 Guide*, SG24-2228-01.
- *IMS/ESA Version 6 Shared Queues*, SG24-5088.
- *IMS/ESA Shared Queues: A Planning Guide*, SG24-5257.

1.4 Extended Terminal Option

ETO allows for connection of terminals and users to the IMS system without having to pre-define them using the system definition process. Users can obtain IMS connectivity from any VTAM terminal, even though that terminal has not been pre-defined to IMS. The VTAM terminal, however, should be identifiable from within IMS by means of a generic descriptor. IMS builds dynamic structures that define the terminal and the user from information received from VTAM, the logon/user descriptor, and customization defaults.

With ETO the user's communication status is linked to the user structure and not the terminal. In case of an untimely session termination, this allows the output message to be linked to the userid without being concerned about connectivity between the terminal and IMS. The output message can be obtained by signing on to another terminal, in the same IMS, and performing an asynchronous retrieve.

The usage of ETO, in a VGR environment with Shared Queues implemented, is beneficial, in that any significant communication relationship with IMS would be related to the user. Following a breakdown of the link between a user's terminal and IMS, the user could sign on from a different terminal (possibly to a different IMS) using the generic resource name. This would allow the user to receive the output message, even if it is asynchronous.

The above can be contrasted with statically defined (included in the IMS system definition generation) terminals. In the case of a session failure involving a static terminal, if any significant status exists, then the relationship between the terminal and original IMS is maintained, and logging on through the VGR group name (to another IMS) is not allowed. The affinity is retained in this case, and requires the user to log back on to the original IMS. This may require the user to wait for an emergency restart. Session failures that do not involve significant status conditions allow the terminal to logon to any IMS.

1.5 Different VGR implementation scenarios

In this section we provide different example scenarios that depict how VGR can be used to assist in designing your IMS setup.

1.5.1 Scenario 1: full sysplex integration

VGR may be used in a sysplex containing multiple IMS systems with each running on a different LPAR. Data would be shared, ETO may be used for terminal definitions (user logons) and Shared Queues may be used. In the case of a failure, processing could be shared between the remaining LPARs, and/or the IMS workload could be distributed between the remaining IMS systems.

In the example described above, all IMS systems have been defined (at system generation) to be similar to each other. This scenario is applicable to those IMS installations where a premium is placed on high availability of all application systems. An illustration of this can be seen in Figure 1.

Logon to IMS is to a VGR group and, in the case of a failure, logging on again (to a VGR group, or directly to an available IMS) minimizes downtime of business processes. An example of this would be where the user logs on to the VGR group

name, and a session is established with an IMS in the generic resource group. Transactions issued by the user are placed on the Shared Queue, processed by any IMS in the Shared Queue Group, and the reply is then placed on the Shared Queue again. From here, the output message is available for retrieval and can be sent to the terminal/destination.

In case of an IMS failure, any transaction not being processed by the failing IMS would still be available to any remaining IMS for execution. The user, initially logged on to the failed IMS, can retrieve the output message by logging on to the VGR group name again (for VGR to determine session connection, possibly with a different IMS) and, through Shared Queues, thus complete the message processing cycle.

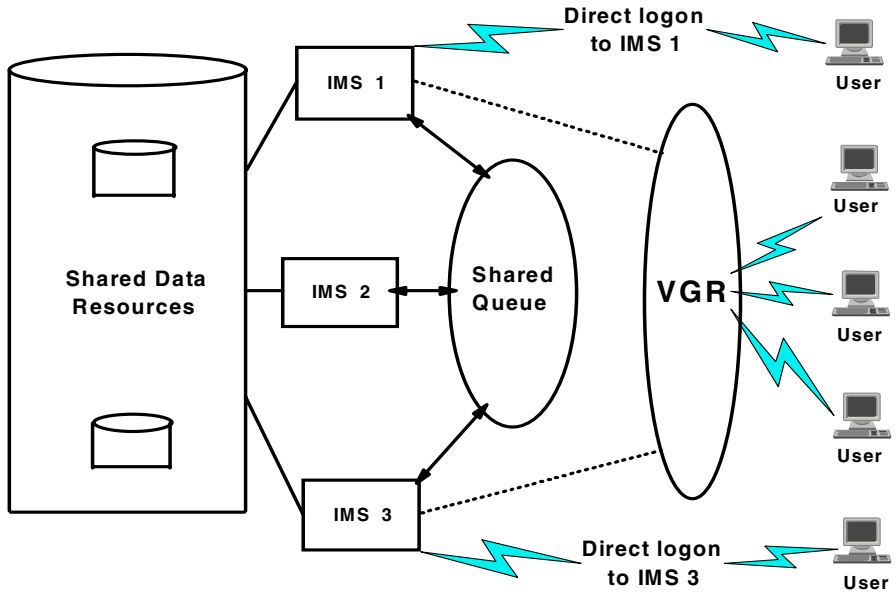

Figure 1. VGR and IMS: full sysplex integration

1.5.2 Scenario 2: Back-End / Front-End

The difference between this and the previous example, is that it includes the concept of differentiating between Back-End and Front-End implementations of IMS. The Front-End IMS systems are used to handle terminal communication. This entails getting a message and putting it on the queue, or retrieving an output message from the queue and sending it to the destination. The Back-End IMS systems read messages from the queue, process them, and insert reply messages into the queue.

In Figure 2 on page 5 the two Front-End IMS systems (or possibly only one of them) handles terminal communication, put input messages on the Shared Queue and retrieve output messages from the Shared Queue. The Back-End IMS systems processes the transaction(s).

In the scenario depicted in Figure 2, only one Front-End IMS system needs to be up with VGR. If it fails, another can be started (on a different MVS) and connected to the same VGR group name. This would allow processing to continue (although the users would need to sign on again).

Another possibility would be for one of the Back-End IMS systems to be added to the VGR group. Sessions would re-connect even faster, as the delay would be the time taken to issue an IMS command.

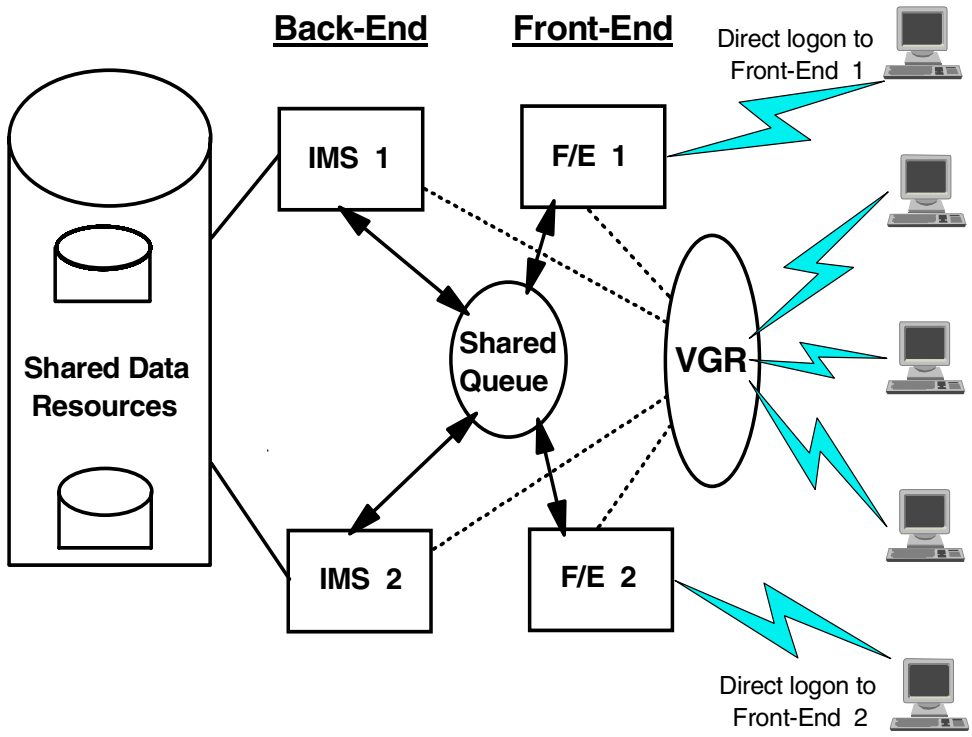

Figure 2. VGR and IMS: Back-End / Front-End

1.5.3 Scenario 3: multiple VGR groups

In this example, applications may be divided based on fast (or mission critical) transactions, and slower (but still required) transactions (or business processes). Processing is on different IMS systems while operating in a full data sharing environment. Two different VGR groups are created for these two groups, and the IMS systems are split between these two VGR group names. See Figure 3 on page 6 for a depiction of this scenario.

In this example, IMS1 and IMS2 handle all fast/critical business processes, while IMS3 and IMS4 handle slower transactions. This is an attempt to reduce the impact of slow transactions (in a bank these would normally be associated with a back-office process) upon the faster ones (for instance, where a bank's client makes use of an Automatic Teller Machine).

Note: *Although CPU impact would be reduced in the above scenario, data contention may still remain a considerable issue.*

If one of the IMS systems in the VGR1 group (containing the critical processes) fails, an IMS could be removed from the second VGR group and added to VGR1 in place of the failed IMS. This would ensure similar processing power within a short period of time. A failure of one of the IMS systems in the VGR2 group would not affect the critical processes of the business.

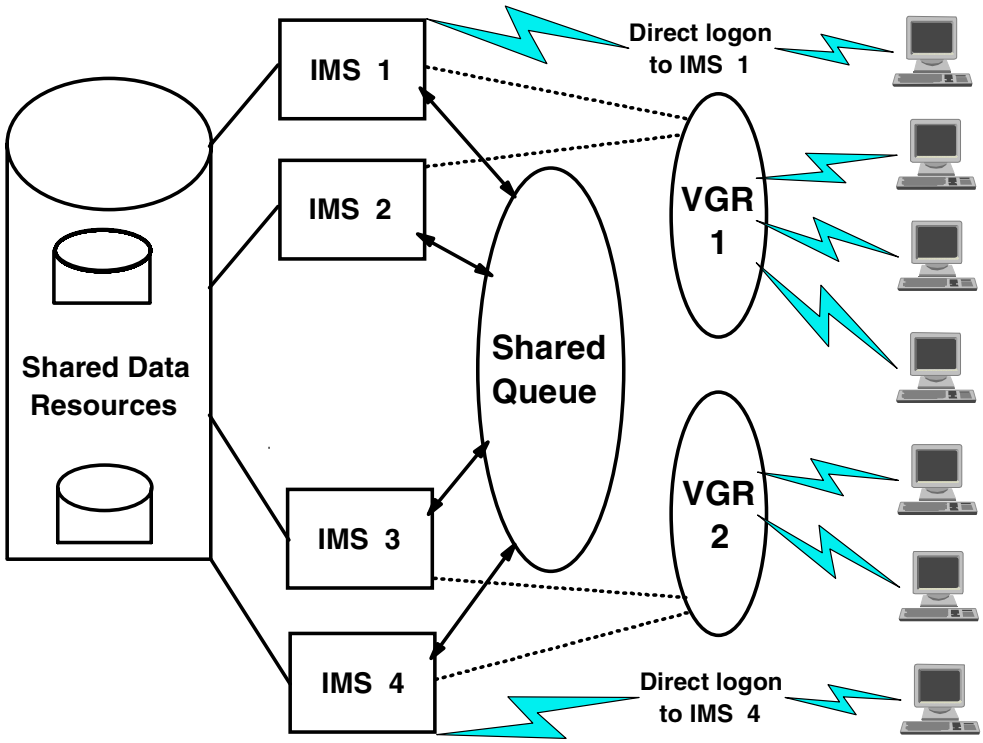

Figure 3. VGR and IMS: multiple VGR groups

1.5.4 Summary of example scenarios

The above examples show three different ways of implementing VGR with IMS, but any of the concepts in these scenarios could be applied together. The ideal implementation for each IMS customer would differ according to business and processing requirements.

In all three examples, the most important factor for consideration is availability of mission-critical processes. VGR (in conjunction with other IMS features) provides a mechanism whereby the impact of IMS failure, from an end user perspective, can be markedly reduced.

1.6 Benefits of VGR

In a sysplex environment, the current impact of an IMS failure, to online users, is limited to only those terminals/users connected to the failed IMS. With VGR implemented, the user can logon after an IMS failure and establish another session with an available IMS (in the VGR group). This can be done using the same logon process (to the VGR group).

The outage period for individual users, following failure of an individual IMS, is greatly reduced. The user can logon immediately to the same generic resource group name and be connected to another (available) IMS system. This would entail minimal data or message loss as, in most cases (if in a Shared Queue environment), the user would be able to continue the interrupted transaction.

Balancing terminal sessions between different IMS systems, using WLM, VTAM's session count, or a user-specified algorithm, can be done much more effectively.

In a Shared Queue environment, with WLM determining session destination for VGR, a faster transaction turnaround time could be expected. The terminal/user logon would be routed to the IMS system with the most capacity. This would allow for more transactions to be processed on the local IMS, resulting in a reduction of some of the Shared Queue overhead of global processing.

IMS systems can be dynamically added to or removed from the VGR group without affecting the user. This allows for effective management of new (short term) workload and incremental maintenance (changes to individual IMS systems).

In summary, VGR allows the IMS customer to better exploit the advantages of a Parallel Sysplex environment by reducing the impact of an IMS failure as experienced by an individual user. In addition, the communication workload of a failed IMS can be spread between other IMS systems (in the generic resource group) and, if using WLM, CPU capacity can be better utilized.

Chapter 2. The VGR function of VTAM

VGR, the generic resources function within VTAM, allows for a single logon to an APPLID name to represent a group of active application programs that all provide the same function. The generic resource name is assigned to multiple active application programs simultaneously, allowing VTAM to choose between them. Active application programs can be dynamically added or removed from the resource groups.

In the IMS environment, the generic resource group represents all those IMS systems in a Parallel Sysplex that have been selected for inclusion in VGR. In case of a session failure, be it IMS, MVS, CEC, or VTAM, users can log on to another IMS system through the generic resource name and continue working.

Session establishment before VGR was directly to an IMS APPLID. The workload was balanced manually or through a session manager exit. Users logged on to a specific IMS system directly. If there was a system failure, then the user would not be able to logon and continue working until the IMS system was available again.

Using Figure 4 to illustrate an example, USER1 logs onto IMS1, and USER2 logs onto IMS2 directly. If either of the IMS systems is unavailable, one of the users would not be able to connect to that IMS until it is available. In this example, there is an outage that affects 50% of the network.

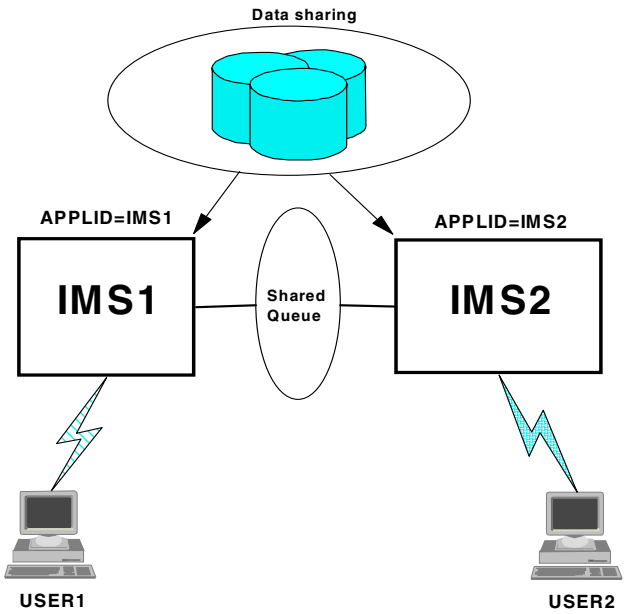

Figure 4. Without VGR

In an IMS environment that uses VGR, users would logon to a generic name, and be routed to any IMS in the generic resource group. If a failure occurs, the user would logon again using the generic name, and would, in most cases, be connected to the same IMS, if available, or any other IMS in the generic resource group, without any loss of service other than the time taken between session failure and session establishment to possibly another IMS system.

Figure 5 is used to illustrate an example of an IMS VGR environment. USER1 and USER2 logon to a generic resource name, IMS. If one of the sessions to IMS1 fails, the user would logon again using IMS, and would get connected to IMS1, if available, or to IMS2. In this case, availability of IMS to end-users is *not* affected by the unavailability of an IMS.

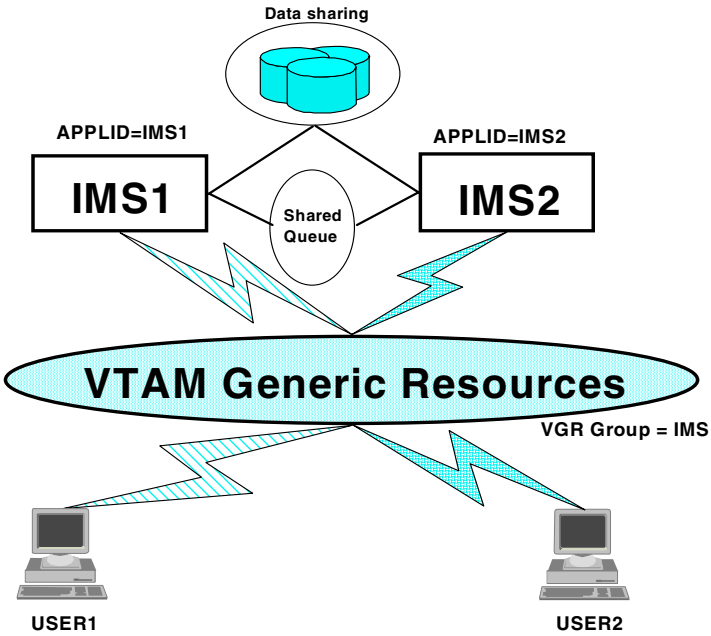

Figure 5. With VGR implemented

IMS defines a VGR name by specifying it in the startup parameters in IMS. When the first IMS starts up, or when the generic resource name is activated for the first time in IMS, VTAM creates a generic resource group. The ISTGENERIC structure gets updated with the generic resource name,and an entry for the APPLID of the IMS that activated the generic resource name is added to the member list of the generic resource group. If the Coupling Facility structure is not already allocated, VTAM allocates the structure and then creates the generic resource group.

We begin this chapter by introducing some terminology used in this book; then we discuss generic resources from a VTAM perspective. This is a high-level discussion, and is intended to give the IMS systems programmer an overview of VGR.

2.1 Terminology used for VGR

A *generic resource name* (GR name) is defined in the IMS startup parameters, and is the name used when logging on to the generic resource group.

A *generic resource group* (GR group) is made up of one or more IMS systems that have the same generic resource name. Any IMS system that has the same generic resource name is said to be a member of that generic resource group.

A *generic resource member* (GR member) is an IMS system belonging to a generic resource group.

A terminal currently in session with a system in a generic resource group is said to have an *affinity* to that system. A terminal with a *significant status* in IMS, such as a terminal operating in conversational mode, is said to have an *affinity* in VTAM to that IMS, even if the terminal is not currently in session with IMS.

A terminal that has a requirement to connect to a particular IMS due to protocol or integrity is said to have a *session affinity* to that IMS. The affinity remains after session termination.

ACB is the term used to describe the application program network node that can be used to establish a session with the IMS system in a pre-VGR environment. The IMS ACB is usually defined using the APPLID parameter in the sysgen which can be overridden by the APPLID1 parameter in IMS startup.

2.2 VGR in a sysplex environment

VTAM provides a single image view of multiple subsystems across MVS images in a sysplex environment. VGR is a VTAM facility that allows logon through a generic name that maps to one or more VTAM applications. A Coupling Facility structure called ISTGENERIC is used to store the name of the generic resource, and relate it to a group of real ACB names. The structure name can be any name defined by the VTAM systems programmers; the default name is ISTGENERIC, and we shall call the structure this for the purposes of the book. The structure keeps track of what terminal is connected to which real ACB by means of an partner or affinity list in the ISTGENERIC structure. Refer to Figure 6 for a description of the structure.

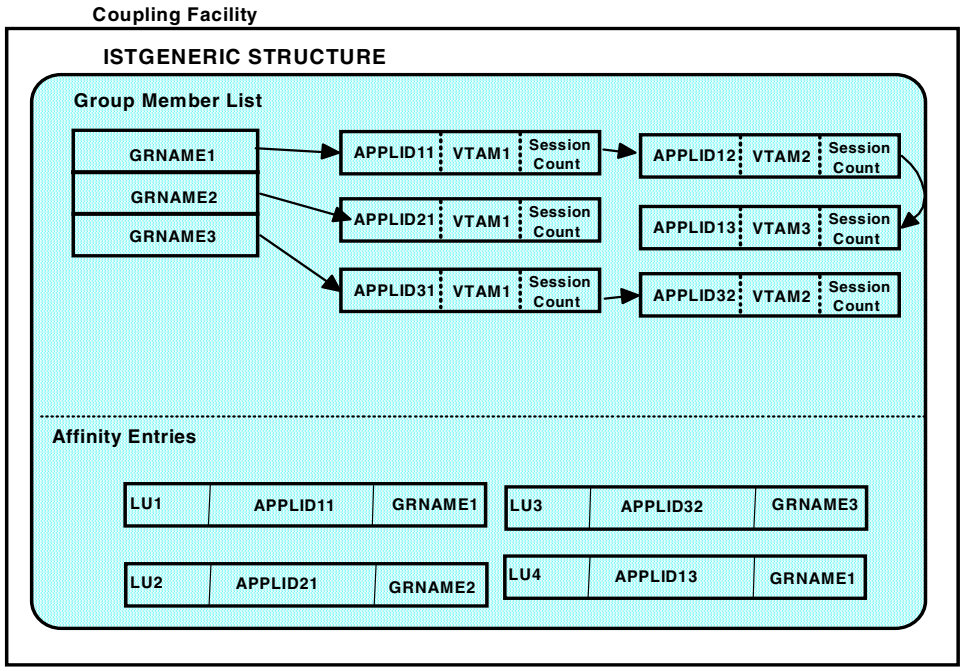

Figure 6. ISTGENERIC structure

The figure above shows a conceptual layout of the ISTGENERIC structure containing information about VTAM generic resources. The structure is logically divided into two sections: a group member list and an affinity table.

The group member list is made up of three generic resource groups, with the names of GRNAME1, GRNAME2 and GRNAME3. The generic resource group GRNAME1 has three generic resource members, APPLID11, APPLID12 and APPLID13. GRNAME2 has one member, APPLID21 and GRNAME3 has two members, APPLID31 and APPLID32. The session counts of all application programming network nodes are recorded in the structure to be used by VTAM for determining which generic resource member a session should be established with, if the session was requested with a generic resource name. The local VTAM name is associated with each member of the generic resource group.

LU1 requested a session using the generic resource name GRNAME1. VTAM could connect the session to any generic resource member of that group; namely APPLID11, APLID12, or APPLID13, based on the information in the group member list. VTAM elected to connect LU1 to APPLID11 based on the session selection criteria used, and an entry was created in the affinity list with the relevant session establishment information. Similarly:

- LU2 requested a session with generic resource group GRNAME2 and the session was connected to APPLID21.
- LU3 requested a session with GRNAME3 and was connected to APPLID31
- LU4 requested a session with GRNAME1 and was connected to APPLID13.

2.2.1 Affinity management

Use of generic resources increases the need to manage the association of LUs and VTAM APPLIDs. An LU may now have affinity to a specific resource in the generic group which must be managed to ensure that no important information is lost. Depending on how the VGR is defined, either IMS or VTAM may manage this affinity.

Affinities that should persist through a VTAM failure include LU 6.1 sessions, LU 6.2 sessions with SYNCPT synchronization support, and multi-node persistent sessions.

VTAM also provides an installation-wide exit routine that can be invoked to override the selection, if no affinity exists. IBM provides a default exit routine, ISTEXCGR, that can be modified to select the member based on user-specified criteria. Both VTAM and the MVS workload manager (if present) provide the name of a generic resource member to be used for session establishment. The exit routine can select either one of the provided application program network names, or continue processing user-specified criteria to select the member to be used. For more information, see the Generic Resource Resolution Exit Routine described in *OS/390 eNetwork Communications Server: SNA Customization*, LY43011000.

2.2.2 Activating a generic resource group

When an application program network node becomes active, it passes as one of its parameters to VTAM, the name of the generic resource group it joins. VTAM then creates the generic resource group name and keeps a list of members for each group created. Each time a session is established with the application using the generic resource name, VTAM registers that information in the affinity table.

2.2.3 Logging on using a generic resource name

Figure 7 shows an example VTAM selection screen. The user has the choice to logon to the VGR group by entering IMSACB. He could also chose to logon on to a specific IMS system by closing either IMSACB1 or IMSACB2.

```
EMSP03   ITSO Application Selection   Help: 293-1660 Term : TCP38029
                                      Date: 09/08/99 Time 11:52:45
                                      User: TCP38029 Group : DLPUBGRP
                                      Broadcast:    Printer:

Esc PA3  Cmd PF10 Prefix $$       Print        Broad
   Name       Status  M/B-JmpK |  Name       Status     M/B-JmpK
 IMS1       06:00     PF22     |  SC43TS     18:14       PF22
 IMS2       06:50     PF22     |  SC47TS     17:20       PF22
 IMS        06:00     PF22     |  SC53TS     12:30       PF22



Enter application name or a command.(LOGOFF terminates all sessions..)
 ==> ____________________  ________  ________  _______     Page 002
PF1=Help  PF2=Lang  PF3=Disc  PF4=Keys  PF7=Backw  PF8=Forw
```

Figure 7. VTAM Application Selection screen

If an LU requests a session with a generic resource name, VTAM first checks whether the LU has an affinity to any member in the generic resource group. An affinity is represented by an affinity entry in the ISTGENERIC structure. If an affinity does not exist, then VTAM uses MVS workload manager to determine (based on current workload), which generic resource member is best capable of managing that session's workload. If an affinity does exist, then VTAM connects the session to the partner APPLID and disregards any workload balancing criteria.

The selection of which generic resource member to choose can be overridden using an exit in VTAM called the Generic Resource Resolution Exit. More information on this exit can be found in this book in Chapter 5, "Customizing VGR for IMS" on page 49.

If an application or an LU that is part of a local SNA or local non-SNA major node initiates a session to a generic resource, and no affinity exists, VTAM first attempts to establish a session with a generic resource member on the same VTAM node. It is important to discuss local SNA or local non-SNA major nodes with your VTAM systems programmer to ensure that your environment can fully exploit VTAM generic resources, and is not restricted in workload balancing due to the nature of the network connections in your environment. If you do not consult your VTAM systems programmer, then the results obtained when using VTAM generic resources might not be those you expected.

2.2.4 Logging onto a real ACB name

If a group of applications belongs to a generic resource group, logons are still allowed directly to the application program network name. The session count for that ACB is incremented in the ISTGENERIC structure, and an affinity entry is created in the structure, but the session is established without any consideration given to the workload on that member. Because the session count is incremented, that session is taken into account when balancing workload across generic resource members during session establishment using the generic resource name.

If an LU is using a mix of generic resources and real ACB names, and the first session is established directly to an ACB, not using the generic resource name, then VTAM establishes the session with that ACB. If the LU requests sessions using the generic resource name, then the sessions are established with any generic resource member other than the one they have connected to directly.

When you specify GRAFFIN=VTAM, IMS automatically insures that all terminal status conditions are reset for sessions using the IMS generic resource name **before the signoff or logoff exit**, or before the next logon or signon to a failed and restarted IMS.

2.2.5 Workload balancing

VTAM balances sessions across generic resource members rather than across MVS images. Consider a generic resource group made up of three application programs. If two application programs reside on one MVS image, and the last on another, VTAM balances the sessions evenly across each application program. The MVS image with two application programs in the same generic resource group will have twice the network load than on the other MVS image with only one application program.

MVS workload manager can be used to allocate sessions according to defined goals. This ensures session allocation across MVS images, based on the capabilities of the system as a whole, and not on the number of sessions per generic resource member. Consider the same environment as before. The sessions are allocated to the capability of the MVS images to meet their goals.

2.2.6 Restrictions

The following restrictions apply:

- An application program can be known by only one generic resource name.
- Generic resource members using the same generic resource name must have the same NETID.
- Generic resource names must be unique within a single network. A generic resource name cannot be identical to:
  - A USERVAR
  - An alias name
  - A real LU name

More restrictions may also apply, based on the network environment you are using. The IMS systems programmer must work very closely with the VTAM systems programmer to ensure that the network configuration is designed to make use of VTAM generic resources, and to ensure that the configuration in your environment does not restrict the benefits of using generic resources. More information on VGR can be found in the manual *OS/390 eNetwork CS SNA Implementation Guide*, SC31-8563.

2.3 VGR in an IMS environment

If more than one IMS system uses the same generic resource name, then the ISTGENERIC table holds an entry in the member list for each APPLID in the generic resource group. The generic resource group in the structure contains certain information related to the member APPLIDs such as the session count for each IMS in the generic resource group. The member list contains an entry for each member in a generic resource group, as well as the session count for that APPLID.

VTAM maintains the affinity list, but each IMS in the generic resource group is the owner of the information in the affinity list. IMS controls the entries in the affinity list.

Each time a terminal logs on to the generic resource group, then VTAM adds an entry to the affinity list with the terminal name and the APPLID of the IMS system to which it has an affinity. Affinities will be discussed in more detail in Chapter 3, “Managing affinities and significant status” on page 25.

When a terminal logs on to IMS using the generic resource name, then VTAM determines which IMS in that generic resource group to connect the terminal to. The order followed to assign a session to an APPLID is as follows:

1. Existing session affinity
2. VTAM Generic Resource Resolution Exit
3. MVS Workload Manager (WLM)
4. Session counts

VTAM updates an affinity list in the ISTGENERIC table with an entry for the terminal, and the name of the ACB that it connected the terminal to, as well as the generic resource name used to connect with. The terminal is said to have an affinity to the IMS to which it is now connected. Generally, a terminal continues to have an affinity to an IMS system until logoff or signoff.

Terminals can continue to logon directly to an IMS system, even if the IMS is a member of a generic resource group. VTAM updates the information in the Coupling Facility regarding the session count, but VTAM does not manage affinities for that terminal. The terminal is taken into account if VTAM is using session counts in session establishment.

All LU0, FINANCIAL terminals, and ISC links, by default, are said to have an affinity with the first IMS system to which they get connected after the activation of the generic resource environment, until a cold start of IMS is performed. Terminals of this type always establish a session to the same IMS system, until that system is cold started. These types of devices participate in VTAM generic resources in network balancing at initial logon.

If a session failure occurs, then the terminal's affinity is removed from VTAM and can logon again using the generic resource name and connect to any IMS in the generic resource group. If a terminal has an affinity with a specific IMS, the terminal can only logon on to the generic resource name once a session can be re-established to the IMS with which it holds an affinity.

A session initiated by an IMS system bypasses affinity checking. A terminal can have an affinity to an IMS system in the generic resource group, and a session can be established between that terminal and a different IMS, regardless of the affinity. This must be kept in mind when sessions are initiated from IMS. Affinities are not honored in this case.

VTAM establishes sessions based on affinities. If a terminal has an affinity to an IMS system, denoted by an entry in the affinity list, then VTAM always establishes a session with the IMS APPLID named in the affinity list.

2.3.1 Affinities

An affinity is created during the first request for session establishment using the generic resource name. Once the session is established, the affinity is created.

Affinity information is controlled by IMS, even though VTAM manages the information. IMS determines at session termination whether the affinity can be removed or not. Affinities are kept after session termination, depending on the significant status of a terminal, as well as the type of terminal, for example, SLUP, FINANCIAL, or ISC link.

2.3.2 Significant Status

A terminal is said to have significant status if the terminal is in:

- Full function response mode
- Fast path response mode
- Conversational mode
- Exclusive mode
- Test mode
- Exclusive mode
- Preset destination

2.3.3 Session Affinity

A terminal may have a session affinity to an IMS if:

- The terminal is using set-and-test sequence numbers (STSN) for session integrity of the following:
  - SLUTYPEP (LU0)
  - 3600 Financial
- It is an ISC session with at least one parallel session that has not been cold started.

Affinities are not removed, until the IMS system with which they have an affinity is cold started.

2.4 IMS processing with VGR enabled

VGR has an effect on IMS processing at the following times:

- IMS startup
- Session establishment
- Session termination
- IMS failure
- IMS restart

VGR is activated in IMS at IMS startup time, or when a command is issued to start VGR.

A terminal or device requests a session using the VGR name. At session termination, such as logoff or signoff, IMS performs affinity resolution before ending the session. If IMS fails, and the Extended Specific Task Abnormal Exit (ESTAE) processing is driven, IMS can also perform affinity resolution during IMS restart.

The VTAM generic resources processing in IMS are discussed in some detail below. The issues that are discussed, and the processes behind them, are:

- Activating VTAM generic resources: IMS activates VTAM generic resources either at startup, or by issuing a command.

- Removing a generic resource member: IMS can be removed from a generic resource group at shutdown time, or when requested by an IMS command.
- Session establishment.
- Session termination.
- Session failure.

2.4.1 Activating a generic resource group

A generic resource group is only created when the first IMS starts up with a generic resource name specified in the IMS startup parameters, or when an IMS command is issued to start IMS participating in VTAM generic resources. VTAM allocates the ISTGENERIC structure if it is not already allocated. The generic resource group is created using the generic resource name if it does not already exist. An entry is added to the generic resource group for the generic resource member that has just activated VTAM generic resources.

An entry is added to the structure with the APPLID of the IMS that started the generic resource name. Each subsequent start of an IMS system with the same generic resource name results in the addition of that IMS's APPLID to the generic resource group in the Coupling Facility. The ISTGENERIC structure contains an entry for every generic resource member in the generic resource group. Refer to Figure 8 and the text below for more details of starting VGR.

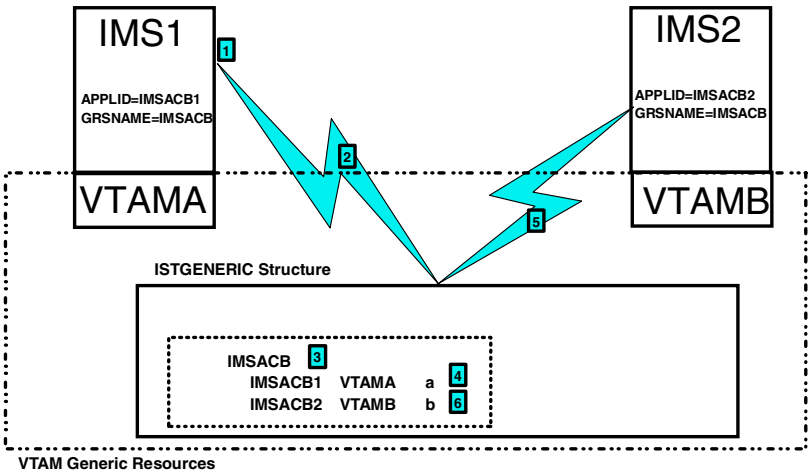

Figure 8. Activating a VGR group and member

IMS1 has an APPLID of IMSACB1 and a GRSNAME of IMSACB.

1. IMS1 starts up with a cold start, using the generic resource name of IMSACB for the first time.
2. When IMS1 performs the /START DC, the VTAM APPLID IMSACB1 is activated.
3. VTAM creates the generic resource group entry in the Coupling Facility.
4. VTAM then adds an entry to the Coupling Facility structure with the name of the IMS1 APPLID IMSACB1. (VTAM allocates the structure if it has not already been allocated.)

5. When IMS2 is started with a cold start, and the /START DC is performed, IMS requests a session with VTAM, and VTAM opens the APPLID.
6. VTAM then adds an entry to the generic resource group for the APPLID of IMS2, IMSACB2. VTAM does not need to create the generic resource group because it was created when IMS1 issued the /START DC.

2.4.2 Removing a generic resource member

There may be a time when you want to remove an IMS system from participating as a generic resource member in a generic resource group. It is possible to prevent sessions from being established to IMS when the session is requested using a generic resource name. This is done by issuing a command in IMS to stop VTAM generic resources. The IMS APPLID is deleted from the generic resource group in the ISTGENERIC structure. Any future logons using the generic resource name are routed to other IMS systems in the generic resource group, as long as no sessions affinities to that IMS exist. If affinities exist with an IMS system where VTAM generic resources is in a stopped status, any new session requests are established with the IMS to which the session has an affinity. A terminal currently in session with IMS continues to process as normal. As terminals logoff/signoff IMS, the session count for the IMS is reduced, and if no affinities exist to that IMS, no new sessions are established.

Affinities are not affected when an IMS system is removed from a generic resource group. To remove affinities, it is necessary first to understand the intricacies involved in affinities and significant status, which are discussed in detail in Chapter 3, “Managing affinities and significant status” on page 25. Refer to this chapter for more information on affinities, and the different methods for removing affinities.

2.4.3 Session Establishment

When a terminal requests a session with a generic resource name, then VTAM selects an APPLID in the generic resource group for connectivity. Once VTAM has made that decision, it establishes the session with the chosen APPLID. Once the terminal is in session, it is considered to have an affinity with the APPLID to which it is connected. VTAM updates the affinity list with the terminal name, and the APPLID to which it is connected.

2.4.3.1 How VTAM chooses an ACB to connect to

VTAM determines which generic resource member to connect the terminal to, by using the following process:

1. Existing session affinity:

   If a terminal has an affinity to an IMS, that is, it has an entry in the ISTGENERIC structure, then VTAM connects the terminal to the IMS with which it has an affinity.

2. VTAM generic resource resolution exit (ISTEXCGR):

   ISTEXCGR is an exit that is used to determine which generic resource member to connect the session with. This exit can be customized and another method of allocating sessions can be determined, if necessary. The default exit with no customization uses workload manager to assign the session establishment to a particular system.

3. MVS workload manager:

   MVS workload manager determines which IMS to route the session to, based on the criteria defined in the workload manager policy; WLM must be operating in goal mode.

4. Current session counts:

   If none of the above methods are successful, VTAM routes the session to the system with the lowest session count. Terminals logged on directly to IMS and not through the generic resource name is taken into account when VTAM determines session establishment using session counts.

VTAM does not process using both workload manager and session counts, unless the session establishment fails with workload manager; only then is the session count method used.

A user exit can be coded using ISTEXCGR as a sample exit. This exit can then determine the method that best suits your environment. Refer to 5.1, “VGR resolution exit” on page 49 for more information on customizing the exit.

2.4.3.2 Establishing a session

When a terminal logs on using a generic resource name, VTAM tries to establish a session based on its selection criteria. If an affinity exists to an IMS, and VTAM cannot establish a session to that IMS for that terminal, the logon fails. In this case, a session could only be established with another generic resource member if the affinity was deleted, or if the session request was made using the IMS ACB name, and not the generic resource name.

Refer to Figure 9 when reading the description below, about how VGR establishes a session IMS environment.

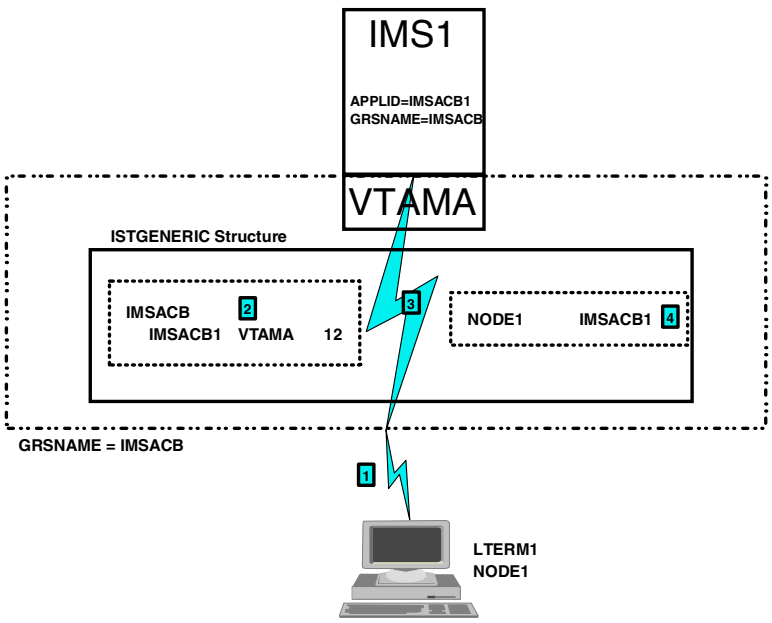

Figure 9. Session establishment using a generic resource name

A GRSNAME of IMSACB has been defined in IMS1. IMSACB1 is the APPLID of IMS1. The generic resource group has been started. NODE1 does not have an affinity to any IMS in the VGR group.

1. NODE1 requests a session to be established with the generic resource name of IMSACB.
2. VTAM determines which session to connect NODE1 to, using the information in the Coupling Facility structure.
3. VTAM connects NODE1 to APPLID IMSACB1. NODE1 is said to have an affinity to IMSACB1.
4. An entry is added to the affinity list for NODE1 with an affinity to IMSACB1.

2.4.4 Session Termination

A session can be terminated in IMS by one of the following methods:

- Logoff or signoff
- Inactivating the terminal in VTAM
- /CLSDST command in IMS
- Inactivating the IMS ACB (including /STOP DC)
- Shutdown of IMS

All of the above methods follow the same logic. Very generally, this logic is as follows:

1. Process affinity if there is no significant status or terminal session affinity with IMS.
2. Call signoff exit (ETO).
3. Process any affinity or significant status changes if altered by the exit (ETO).
4. Move significant status from terminal to user, and delete terminal control block (ETO).
5. Call logoff exit.
6. Process any affinity of significant status changes if altered by the exit.
7. Session is terminated in VTAM.

If an IMS session is terminated, and a terminal has no significant status in IMS, then the affinity is removed from VTAM. An affinity only exists in VTAM if the terminal has a significant status in IMS, or has a session affinity with IMS. Since ETO terminals are deleted at signoff, there is no terminal control block available to determine the significant status of the terminal. The significant status conditions are moved to the ETO user control block. Refer to Figure 10.

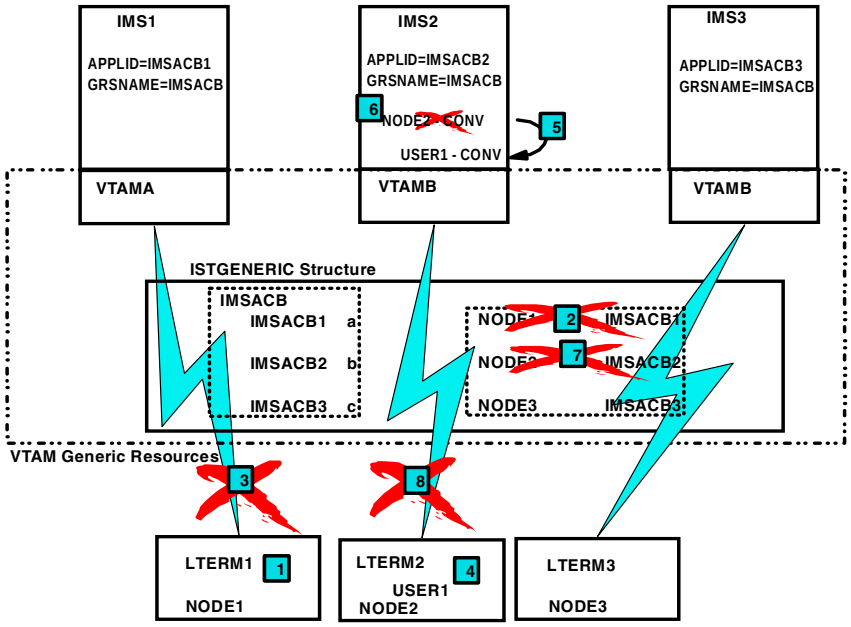

Figure 10. Session termination

NODE1, NODE2 and NODE3 are connected to IMS1, IMS2 and IMS3 respectively. NODE1 and NODE3 are statically defined. NODE2 is defined using ETO. USER1 is logged onto IMS2 using NODE2.

1. NODE1 issues /RCL to logoff IMS.
2. No significant status exists in IMS, and the affinity is deleted.
3. The session is terminated.
4. USER1 logoff off
   Call signoff exit.
5. Node status is moved to user control block
6. Node is deleted
7. Affinity is deleted
8. Session is terminated.

All ETO terminals without a session affinity (non-SLUP, non-FINANCE, non-ISC) have their affinity removed from VTAM at signoff time, regardless of significant status.

The logoff and signoff exits can be customized to remove significant status from IMS. Refer to Chapter 5, “Customizing VGR for IMS” on page 49 for more information.

2.5 Session Termination

The process of session termination is important to understand. Significant status can be deleted by IMS during session termination, and the situations where this happens must be understood.

Session termination can be initiated by any of the following:

- Logoff from a static terminal or signoff from an ETO terminal
- IMS shutdown
- /STOP DC
- IMS failure
- CEC failure
- MVS failure
- VTAM failure
- /V net,inact,ID= flavor of commands, such as:
  - /IDLE NODE
  - /STOP NODE
  - /CLS NODE

The above group can be split into two groups, depending on whether IMS has control of the session or not. If there is an MVS failure or a CEC failure, then IMS has no control over session termination, and affinity and significant status resolution must be done at IMS restart time and session establishment.

In the event of a session termination, the logoff/signoff process is driven, if IMS is still active and in control. If GRAFFIN=VTAM, the affinity is reset before logoff/signoff processing is started.

The logoff and signoff exits are called as part of session termination. The logoff and signoff exits can be customized to reset session status of a terminal or user. Once the logoff or signoff exit has been called, IMS resets any affinities and significant status based on the information returned in the exit. By default, no statuses are altered in the exit. Exits must be customized if your environment requires the resetting of session status.

For further information on exits in this book, refer to 5.2, “Logoff/signoff exits in IMS” on page 53. Refer to 3.2, “Resetting session status” on page 28 for more information on the deletion of session status.

2.5.0.1 Messages in progress

If a session terminates and affinity is deleted in VTAM, you must consider what happens to the output.

In a Shared Queues environment, the message may be available for the terminal from another IMS system in the Shared Queues group. An assumption we are making here is that the generic resource group is made up of IMS systems in the same Shared Queues group.

In a non-Shared Queues environment, the message is only available to the terminal/user when a session gets established to the IMS with the output message on the message queue.

If these messages exist, then the messages are delivered to the terminal asynchronously, and the significant status of the terminal in the IMS system is reset.

More information on messages in progress can be found in 3.2, “Resetting session status” on page 28.

2.6 APPC and VGR

Enabling VGR for APPC is independent of IMS. It requires the addition of the generic LU name to be added to the APPCPMxx parmlib member. To use the generic LU, the side information must be updated to change the partner LU name to the generic LU name. Any allocate calls in the application need to be made to the generic name. It is recommended that mixed-mode (using both real and generic LUs) allocate calls not be used. Please see the chapter on "Assigning a VTAM Generic Resource Name to APPC/MVS LUs", in *OS/390 V2R6.0 MVS Planning: APPC/MVS Management*, GC28-1807, for a description of how to implement VGR for APPC.

Chapter 3. Managing affinities and significant status

When a terminal logs onto a generic resource, and is connected to an APPLID, then that terminal is said to have an affinity to that APPLID. What we need to go through now, is how and when the affinities are assigned and removed, allowing a terminal to connect to any APPLID in the same VGR group, and what happens to output messages if they exist after a session failure.

To recap, an affinity exists if:

- The terminal is currently logged on using a generic resource name.
- The terminal was previously logged on using a generic resource name, and:
  - Significant status exists in an IMS for that terminal.
  - The terminal is LU0 or 3600 FINANCIAL (ETO or static).

By significant status, we mean:

- Conversational mode
- Full function response mode
- Fast path response mode
- Exclusive mode
- MFs test mode
- Preset destination mode
- Test mode

3.1 Methods of managing affinities

In the IMS environment, there are two methods of controlling and managing affinities. The first method is the default, and is when IMS controls the affinities of terminals; the second method is when VTAM has control of the maintaining of affinities. These options are specified in the DFSDC member in PROCLIB, and the parameter is called GRAFFIN.

There are two further options if you choose the default of IMS managing the affinities. These options are concerned with Extended Specific Task Abnormal Exit (ESTAE) routine processing during an IMS failure. The option you choose determines whether IMS issues a VTAM CLSDST during IMS ESTAE processing or not. If IMS can resolve affinities during ESTAE processing, then IMS notifies VTAM of the applicable affinities that can be deleted. Those non-SLUP, non-FINANCIAL terminals, which have a significant status, will have the affinity retained. This process may delay the ending of the failed IMS system. It is for this reason that the ESTAE option was introduced, to allow customers the option of avoiding the delay. The parameter is called GRESTAE, and is only valid in a GRAFFIN=IMS environment. If the ESTAE does not perform affinity cleanup, then affinities remain to the IMS until after session establishment.

In summary, there are two ways to manage affinities during normal processing of IMS and VTAM:

- Allow IMS to manage affinities.
- Allow VTAM to manage affinities.

There are two methods of managing affinities during abend processing:

- Resolve affinities at abend time during ESTAE processing.
- Retain affinity until after IMS restart.

3.1.1 Allowing IMS to manage affinities

This is the default processing option in a generic resource environment. IMS controls all affinities based on significant status in IMS. Any terminal in session with an IMS always has an affinity to that IMS. A terminal not in session with any IMS in a generic resource environment has an affinity to an IMS only if it has a significant status in an IMS, or if it is a SLUP, FINANCIAL, or ISC terminal. If a terminal was in session with IMS, and it was in one of these modes when the session ended, either by a signoff/logoff, or a VTAM, IMS, MVS or CEC failure, then the terminal would keep an affinity to that IMS until the next logon/signon using VGR to IMS.

This option is the default, but can be specified with GRAFFIN=IMS in the DFSPBxxx PROCLIB member.

If IMS fails without being able to control the shutdown, that is without the ESTAE being driven, then the terminals that were in session with that IMS would not be able to reconnect to any other IMS until such time as the failed IMS is restarted and the sessions connect to the original IMS.

3.1.1.1 IMS resolves affinities during ESTAE processing

IMS uses the ESTAE logic to perform affinity management. After IMS has abended, but before the VTAM ACB is closed, IMS resets the affinities of all the terminals that were in session with it at the time of the abend. All terminals (other than ISC, LU0 and FINANCIAL terminals) without a significant status in IMS have their affinity deleted.

This option is specified using the GRESTAE=Y parameter in the IMS startup parameters. For more information on implementation, see Chapter 4, “Implementing VGR for IMS” on page 41.

To reset the affinities, the IMS ESTAE performs logoff/signoff processing for all active sessions in IMS. Part of the process is issuing a VTAM CLSDST for each terminal without a significant status in IMS. The CLSDST process during ESTAE processing is a serial and synchronous procedure. The effect of this operation should be minimal, but if you are operating in a VTAM cross domain environment, there could be delays or even I/O time-outs across the domain. This could significantly delay the shutdown of IMS, depending on the amount of terminals in session that need to be cleaned up.

As soon as IMS has completed ACB shutdown, those terminals that have had their affinity deleted would be able to logon to any other IMS system in the same generic resource group using the generic resource name.

Terminals that have a significant status in IMS, other than ETO terminals, and all ISC, LU0, and FINANCIAL terminals retain their affinity to the failed IMS. Session establishment using the generic resource name is unsuccessful until the failed IMS has been restarted, and a /START DC has been issued.

Terminals that log on directly to another IMS system using the APPLID of that IMS, and not the generic resource name, are connected to that IMS. Remember that the significant status is on the failed IMS system, and not on the system to which it has just connected.

3.1.1.2 IMS does not resolve affinities during ESTAE processing

IMS bypasses affinity management during ESTAE processing. This reduces the time taken during ESTAE processing and allows IMS to be emergency restarted faster, and to have an outage of a shorter duration. However, during the time between the abend and the /START DC, no terminals that were in session and/or had an affinity to that IMS at the time of the abend would be able to connect to an IMS system in the generic resource group using a logon to a generic resource name. Once the session has been re-established with the failed IMS, then the significant status is cleaned up.

ETO terminal control blocks are recreated during restart, and remain active until the session is re-established with the failed IMS. Depending on your VGR configuration, this could be a long time.

This option is specified using the GRESTAE=N parameter in the IMS startup options.

3.1.2 Allowing VTAM to manage affinities

If the VTAM option is selected for affinity management, then IMS notifies VTAM to manage the affinity for each session that gets established. A bit is set in the affinity table for each session that is to be managed by VTAM. ISC links are not managed by VTAM even if the VTAM option is specified in IMS. IMS always manages the affinity of ISC links.

This option can be specified with GRAFFIN=VTAM in the DFSPBxxx PROCLIB member.

At session termination, either by logoff/signoff or by a failure such as CEC, VTAM, IMS or MVS, the affinity is deleted for all non-ISC sessions.

If a session failure/termination occurs, all affinities held by that session is removed. If the session failure occurred because of an IMS failure, then IMS l automatically deletes all terminal related statuses during signon or logon to the failed IMS system.

All sessions including LU0 and FINANCIAL, but excluding ISC sessions, have their affinities deleted at session termination. The LU0 and FINANCIAL sessions will be cold started for each new session establishment.

ISC links are still managed by IMS, and are not affected by the choice of VTAM to manage affinities.

When you specify GRAFFIN=VTAM, IMS automatically ensures that all terminal status conditions are reset for sessions using the IMS generic resource name **before the signoff or logoff exit** or before the next logon or signon to a failed and restarted IMS.

3.2 Resetting session status

IMS resets session status automatically after a failure if GRAFFIN=VTAM and a significant status exists in IMS. IMS attempts to do logon/signon of the session. Depending on the failure, IMS may need to do this on a subsequent restart. The cleanup is only performed on the IMS that has the significant status. Remember that the affinity is reset by VTAM, and a session could be established with another IMS in the generic resource group before the significant status has been cleared.

Session status can also be reset with the logoff/signoff exits. This is recommended for the GRAFFIN=IMS option for affinity management. This means that terminals can have significant status reset at logoff/signoff time, and the affinity are removed from VTAM. This reduces the amount of affinities for sessions not connected with IMS, thereby increasing the availability of the IMS systems as a whole to the terminal user. The terminal user is then able to log each session on to any of the IMS systems in the group, instead of only to the IMS system with which it has an affinity. The logoff and signoff exits cannot be used to reset the status of APPC or MSC links.

The logon/signon exits do not have the capability of resetting session status at session initiation time. Sessions cannot be cleaned up at session initiation, unless VTAM is managing affinities. Sessions must be cleaned up at session termination, to allow for greater availability and more network balancing in the generic resource environment.

The significant status types, and the process IMS follows to reset the status, are listed in Table 1 through Table 6, which show the status reset options available for the different types of sessions that may have a significant status set.

Table 1. Status resetting — conversational mode

GRAFFIN=IMS (includes ISC regardless of GRAFFIN)	**GRAFFIIN-VTAM (non-ISC)**
Without signoff/logoff exits, the status is maintained.	Reset status (IMS performs equivalent of /EXIT - Prior to signoff/logoff - Or, at logon/signon (MVS failure)
SIgnoff/logoff exits can reset status (IMS performs equivalent of /EXIT). - Any replies are sent asynchronously or discarded, based on Conversation Abnormal Termination exit.	Any replies are sent asynchronously or discarded, based on Conversation Abnormal Termination exit.

Table 2. Status resetting — full function response mode

GRAFFIN=IMS	**GRAFFIN=VTAM**
Without signoff/logoff exits, the status is maintained.	Reset status: - Prior to signoff/logoff - Or, at logon/signon (MVS failure)
Signoff/logoff exits can reset the status: - Pending output reply messages are sent asynchronously.	Any output messages are sent asynchronously.

Table 3. Status resetting — exclusive, TEST, TESTMFS or preset status

GRAFFIN=IMS (includes ISC regardless of GRAFFIN)	GRAFFIN=VTAM
Without signoff/logoff exits, the status is maintained.	Reset status: - Prior to signoff/logoff - Or, at logon/signon (MVS failure)
Signoff/logoff exits can reset status.	

Table 4. Status reset — fast path response mode

GRAFFIN=IMS	GRAFFIN=VTAM
Without signoff/logoff exits, the status is maintained.	Reset status: - FP local mode if output is available. - FP global mode regardless of output availability.
Signoff/logoff exits can reset status if: - FP local mode and output is available when the exit is called - FP global mode regardless of output availability ELSE status is maintained.	At signoff/logoff or next logon/signon, if IMS outage: - Maintain status: FP local mode (session outage during FP local mode input scheduling or processing and output is not available)

Table 5. Reset status — fast path status

Logon/signon to original IMS system	Logon/signon to another IMS system
Fast Path status reset by previous signoff/logoff or by logon/signon after IMS restart.	Discard any available global mode output; otherwise, dequeue the message after it becomes available.
Fast Path status still set: - Local or global transaction if shared queues, ELSE local only. - Local or global FP output reply available, then discard message and reset response mode if not already reset. - Global FP output reply not available, then reset response mode and subsequently discard output message - Local FP output reply not available, - User remains in response mode, waits for output - Attempts to input a new message will receive DFS2162 message (terminal in response mode), so they must enter PA1/PA2 and await reply	Session is established.

Table 6. Reset status — SNA STSN status

GRAFFIN=IMS	GRAFFIN=VTAM
- STSN status cannot be reset by signoff/logoff exits.	Status reset: - Prior to signoff/logoff - Or, at logon/signon (MVS Failure)
IMS command /CHA NODE xxx COLDSESS allows status to be reset, affinity deleted and cold start of the session.	All other terminal statuses also reset (except FP response)
	All sessions are cold started automatically by IMS (SNA protocol used: Bind, STSN w/sequence #sequel 0's, SDT)

3.3 Affinities and Terminal Types

Some terminal types behave differently in a VGR environment due to varying functionality within the terminal type. The following terminal or session types are discussed from a VGR implementation point of view. We explain how they could operate differently either outside a VGR environment, as opposed to inside a VGR environment, and how affinity management might vary from other terminal types. These terminals and session types are:

- ISC links (ETO or static)
- All LU0 or SLUTYPEP terminals, ETO or static
- All 3600 FINANCIAL terminals, ETO or static
- MSC links
- APPC sessions
- ETO terminals
- Static terminals

3.3.1 ISC Links

ISC links can participate in VGR. Only the first parallel session request can be routed using a generic resource name. Once the session is established, the affinity is created. Each further session request is automatically routed to the IMS system with which the first session has an affinity.

An ISC single-session terminal, which has not been cold quiesced or cold terminated, still has an affinity to the IMS to which it was connected. If a VTAM node is a parallel session ISC node, and not all of the parallel sessions have cold terminated — in other words, there are still parallel sessions active — then the VTAM node is considered to have a session affinity to IMS. If all the parallel sessions have been cold terminated, then the affinity is no longer persistent, and the ISC VTAM node can logon to any IMS system in the VGR group.

If a parallel ISC session initiates a session with an IMS APPLID and not a generic resource name, and then initiates a session with a generic resource name, the second session initiation is routed to any other IMS in the generic resource group other than the IMS to which it logged on directly, regardless of session balancing criteria.

It is advisable, therefore, not to use ISC sessions with mix-mode logons. Ensure that all your ISC sessions use either the IMS APPLID name or the generic resource name, but not both.

3.3.2 SLUP, LU0 and 3600 FINANCIAL terminals

LU0 and FINANCIAL terminals use set-and-test sequence numbers (STSN) to synchronize sessions, and maintain integrity of messages across session failures. Session restart and resyncronization information associated with a session logged on using a generic resource name is not made available to all members of the generic resource group. A warm start is therefore not possible for an LU0 or FINANCIAL session across different IMS systems.

In a generic resource environment, it may be necessary to maintain the STSN for the LU0 and FINANCIAL session. Using IMS to manage affinities ensures that the STSN numbers do not get reset, and that the session is always established with the same IMS.

If VTAM is selected to manage the affinities in an IMS generic resource environment, then terminal affinities are deleted each time session outages occur. If you choose to use VTAM to manage affinities, you must be aware that each time a session is initiated in IMS, IMS performs a cold start of the session during session establishment. IMS cold starts the session by sending the SNA STSN command with a zero sequence number in response to the SNA BIND. This is equivalent to the terminal sending an SNA BIND immediately with an SNA SDT.

If IMS is selected to manage the affinities, then an SLU0 or FINANCIAL terminal has an affinity to the first IMS system it is connected to, using a generic resource name, until such time as a LEAVEGR or cold-type start is performed in the IMS.

For purposes of clarity, we will compare the differences using the three figures below, starting with Figure 11 on page 32.

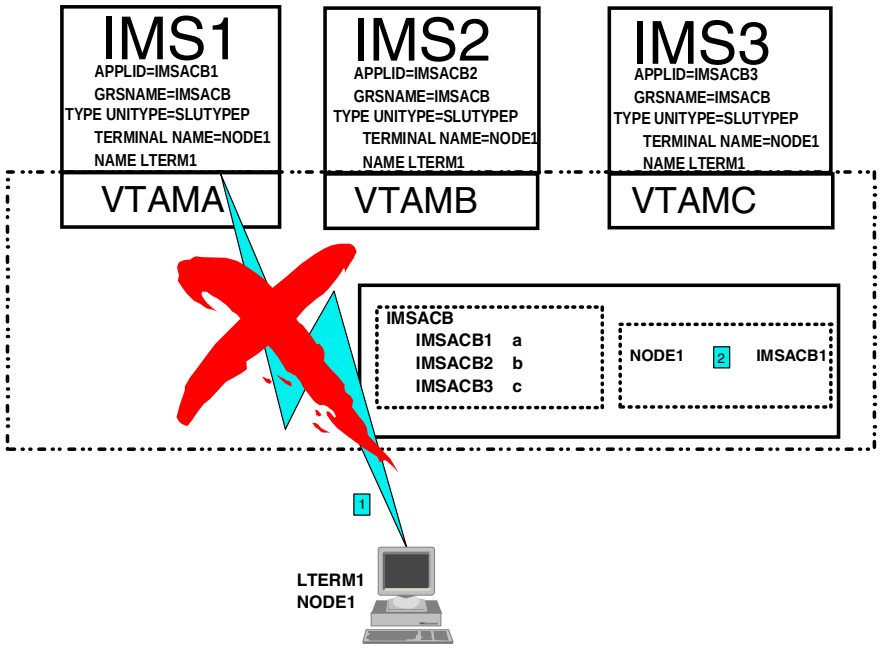

Figure 11. PART 1 — LU0 terminal session failure

As shown in Figure 11, NODE1 is a static terminal defined in IMS1, IMS2, and IMS3. All the IMS systems belong to the same generic resource group. The generic resource name used is IMSAPP.

1. The session between IMS1 and the node is terminated.
2. IMS still has control, and performs logoff/signoff processing.

Figure 12 on page 33 shows the results of a new session initiation if GRAFFIN=IMS, and Figure 13 on page 34 shows results of a new session initiation if GRAFFIN=VTAM.

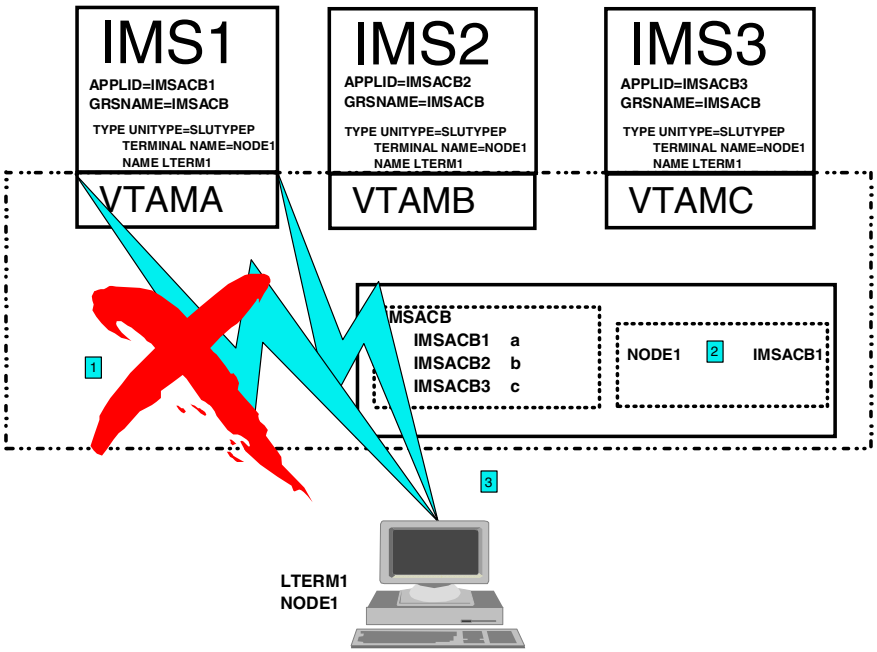

Figure 12. PART 2 — LU0 session failure with GRAFFIN=IMS

Figure 12 shows the following actions:

1. GRAFFIN=IMS, and the session terminates.
2. The affinity of NODE1 to IMSACB1 remains, because LU0 session affinities are not reset at logoff/signoff processing.
3. When NODE1 attempts to sign on again using the generic resource name, then VTAM connects the session to IMS1.
4. The session has not been cold started, and IMS and the LU are re-synchronized using STSNs.

This can be contrasted with the same scenario run on a GRAFFIN=VTAM session, as portrayed by Figure 13 on page 34.

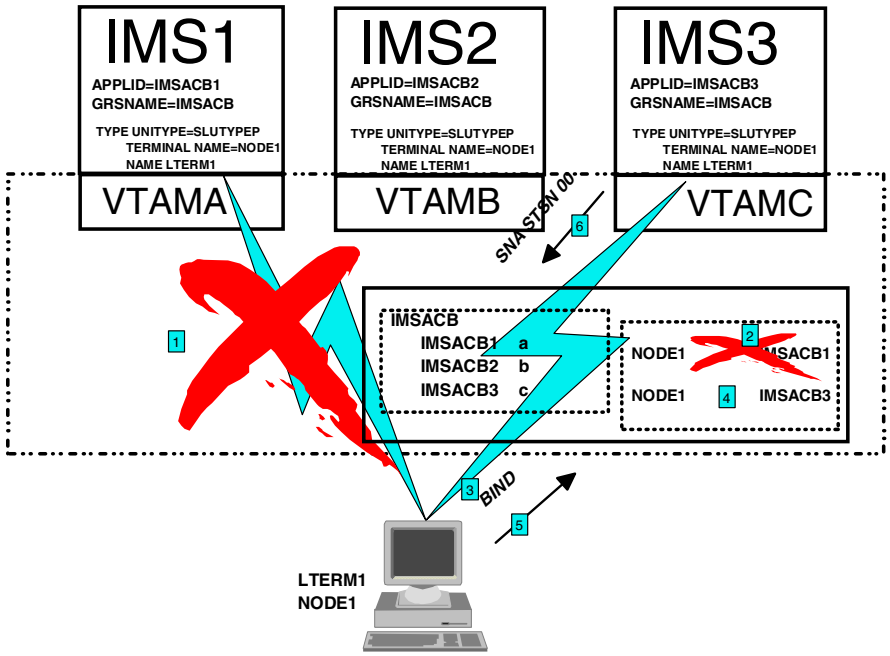

Figure 13. PART 3 — FINANICAL session failure with GRAFFIN=VTAM

Figure 13 shows the following actions:

1. GRAFFIN=VTAM, and the session terminates.
2. The affinity of NODE1 to IMSACB1 is deleted in VTAM as part of session termination.
3. When NODE1 attempts to sign on again using the generic resource name, VTAM connects the session to any IMS in the generic resource group. For the purpose of this example, the session is established with IMSAPPL3.
4. The affinity tables are updated with NODE1 and the affinity to IMS3 as well as an indicator showing VTAM as the manager of affinities.
5. The session sends a BIND request to IMS.
6. IMS cold starts the session by sending an SNA STSN with zeros.

The three figures above indicate quite clearly the differences between GRAFFIN=VTAM and GRAFFIN=IMS during session termination of an LU0 session. The same would occur for FINANCIAL terminal types.

Care must be taken to keep all the implications in mind when choosing an affinity management option.

3.3.3 ETO terminals

ETO terminals always have their terminal affinities deleted at logoff/signoff time no matter what the significant status of the terminal/user may be in IMS. ETO terminals are deleted at logoff/signoff, and the significant status is moved to the USER control block and the terminal is deleted. This can cause complications when the user logs onto an IMS system, when the user has a significant status on another IMS system.

ETO terminals are created dynamically in IMS at logon time. When an ETO user signs off IMS, the use information and session status is moved to the user control block. No status is left in the terminal control block. Therefore, there can be no affinity in VTAM for that terminal, because affinity is on a node level, not a user level. Any affinities for ETO terminals are deleted at logoff time, unless the terminal has a persistent session. Any ETO terminals of type LU0 or 3600 FINANCIAL do not have their affinities deleted, until the IMS to which they have an affinity are cold started.

In a Shared Queues environment, if the terminal is logged off or signed off before the output was sent, the user receives the output no matter which IMS system it was connected to before, but the message is delivered asynchronously. If users are not used to working on different IMS systems in a Shared Queues environment, then they need to be educated on how to receive messages asynchronously.

3.3.4 User procedures

User procedures must be altered to ensure that users are aware of the considerations discussed above. If not, there should be some procedure in place to regularly delete messages queued to ETO users that are not retrieved by the users, thus freeing up space in the Shared Queue, as well as allowing the user structures to be deleted, and thereby freeing up storage.

If the IMS systems are not in a Shared Queues environment, and the user logs onto IMS using a generic resource name, then the session connects to any IMS system in the VGR group, and it could be days before the terminal logs onto the system on which its output is waiting. The user is still in the same state as he was before the session disconnected, and the significant status will be resumed. The user could get a bit confused.

3.4 Affinity scenarios

The affinity scenarios should answer most of the "what happens if...?" questions about affinities. The scenarios discussed are:

- Local VTAM failure
- Logoff and signoff
- MVS or CEC failure
- IMS failure
- IMS cold-type start

3.4.1 Local VTAM failure

If VTAM is managing affinities (GRAFFIN=VTAM), and one of the VTAMs in a generic resource group abends, then another VTAM cleans up the affinities to the IMS associated with the VTAM failure for each terminal other than ISC links. Terminals that were in session though that VTAM to IMS at time of failure could logon again to the generic resource name and be routed to any available IMS system in the generic resource group.

If IMS is managing affinities (GRAFFIN=IMS), affinities remain until VTAM is restarted and a /START DC performed. Until such time, logons to IMS are rejected regardless of significant status in IMS. Once the /START DC is performed, IMS is able to accept logons, and all terminals having an affinity to that IMS are able to connect to IMS.

If VTAM is managing sessions, and one of the VTAMs in a generic resource group abends, then another VTAM cleans up the affinities to the IMS associated with the VTAM failure for each terminal other than ISC links. Terminals that were in session though that VTAM to IMS at time of failure could logon again to the generic resource name and be routed to any available IMS system in the generic resource group.

Table 7 shows the results of session termination that was caused by a VTAM failure.

Table 7. Table of affinities status after a VTAM failure

Types of terminals	GRAFFIN=IMS		GRAFFIN=VTAM
	GRESTAE=Y	GRESTAE=N	
ISC Links / LU61	Affinity NOT deleted	Affinity NOT deleted	Affinity NOT deleted
LU0/FINANCIAL terminals	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted
Static terminals (not LU0 or FINANCIAL)	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted
ETO terminals (not LU0 or FINANCIAL)	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted

3.4.2 Logoff and signoff

Terminals that logoff or signoff have their affinities deleted, with the exception of LU0 terminals and FINANCIAL terminals. These terminals do not have their affinity reset if GRAFFIN=IMS. The reason for this is so that the STSNs are not synchronized between each IMS system, and if the terminal attempted to logon to another IMS system, the STSN numbers would not correlate, and resynchronization using STSN would not be successful.

The logoff and signoff exits can be used to alter the affinities of terminals. These exit changes are not required if VTAM is chosen to manage affinities. More details on these exits can be found in Chapter 5, “Customizing VGR for IMS” on page 49.

Table 8 shows a summary of affinity resolution at logoff/signoff time.

Table 8. Table of affinities status after session termination

Types of terminals	GRAFFIN=IMS		GRAFFIN=VTAM
	GRESTAE=Y	GRESTAE=N	
ISC Links	Affinity NOT deleted	Affinity NOT deleted	Affinity NOT deleted
LU0 / FINANCIAL terminals	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted
Static terminals (not LU0 or FINANCIAL)	Affinity deleted if no significant status	Affinity deleted if no significant status	Affinity deleted
ETO terminals	Affinity deleted.	Affinity deleted	Affinity deleted

3.4.3 MVS or CEC failure

All the IMSs on different MVS images, and all other VTAMs, are still active in the sysplex. Any terminals with an affinity to the IMS on the failed system are not able to logon or connect to any IMS system using the generic resource name until the IMS system is available. Terminals will be able to logon to another IMS if they use the IMS APPLID, and not the generic resource name.

In the case of an MVS failure, the IMS ESTAE is not driven, and can be seen to have a similar result as if IMS is managing affinities, and the ESTAE exit is not used to resolve affinities during abend time.

If VTAM is managing affinities, then the cleanup is similar to that of a VTAM failure. If there is another VTAM in the VGR, then the affinities are removed by another VTAM, but the ISC affinities will still remain. Once IMS and VTAM are restarted, IMS is available for session establishment, but until that time, all terminals other the ISC terminal can logon to any other IMS in the same generic resource group.

Table 9 shows the results of session termination that was caused by a failure in IMS when the ESTAE processing was *not* driven; for example, when an MVS failure occurs. (This table is also applicable after a VTAM failure, as explained in 3.4.1, “Local VTAM failure” on page 35.)

Table 9. Table of affinities status after any failure when IMS cannot run ESTAE

Types of terminals	GRAFFIN=IMS		GRAFFIN=VTAM
	GRESTAE=Y	GRESTAE=N	
ISC Links / LU61	Affinity NOT deleted	Affinity NOT deleted	Affinity NOT deleted
LU0/FINANCIAL terminals	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted
Static terminals (not LU0 or FINANCIAL)	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted
ETO terminals (not LU0 or FINANCIAL)	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted

3.4.4 IMS failure

If IMS abends, then affinity processing depends on the VGR parameters in IMS. If GRAFFIN=IMS, then the affinity processing is determined at ESTAE processing time. If GRESTAE=Y, then all affinities are deleted for terminals without a significant status or a persistent session. Affinities will remain for terminals with a significant status, all LU0 and FINANCIAL terminals and ISC sessions. ETO terminals still have the significant status in the terminal control block until /ERE time, and therefore their affinities are not resolved until session establishment to the failed IMS system.

Table 10 shows the results of session termination that was caused by a failure in IMS when the IMS ESTAE processing was driven.

Table 10. Table of affinities status after IMS failure when ESTAE was driven

Types of terminals	GRAFFIN=IMS		GRAFFIN=VTAM
	GRESTAE=Y	GRESTAE=N	
ISC Links / LU61	Affinity NOT deleted	Affinity NOT deleted	Affinity NOT deleted
LU0/FINANCIAL terminals	Affinity NOT deleted	Affinity NOT deleted	Affinity deleted
Static terminals (not LU0 or FINANCIAL)	Affinity deleted if no significant status.	Affinity NOT deleted	Affinity deleted
ETO terminals (not LU0 or FINANCIAL)	Affinity deleted if no significant status	Affinity NOT deleted	Affinity deleted

3.4.5 IMS cold-type start

If IMS is cold-type started, that is either COLD or COLDCOMM, then **all** affinities are deleted during restart.

It is advisable to shutdown with the LEAVEGR command, to remove affinities at IMS shutdown, if you are planning to start IMS with a cold start. This ensures that all terminals with an affinity to that IMS are able to establish session with any other IMS system in the same generic resource group while IMS is unavailable.

3.5 Choosing an affinity management option

The nuances of each option must be looked at from all angles. Keep in mind the LU0s and FINANCIALs, and the dependency of your environment on STSN when choosing an affinity management option. The STSN dependency alone can immediately determine that GRAFFIN=IMS is your best option. GRAFFIN=IMS does not improve IMS availability in a failure type situation.

If your environment is more focused on integrity of sessions based on significant status, be it STSN or conversation and response mode type of status then IMS is the management option to choose. You should customize the logoff and signoff exits to reset any significant status that a terminal may have that is not necessary for integrity.

If not, it is far better to use VTAM to manage affinities.

3.5.1 Summary of affinity management options

A summary of all the implications of VGR has been discussed above to try and clarify each option. Summarizing the options and results is difficult because of the various causes of session termination and whether IMS can have control of the termination or not.

Remember that the assumption made is that there is at least one VTAM still active and connected to the generic resource structure on the Coupling Facility. If this is not the case, then no session establishment can take place, and affinities are the least of your problems.

3.5.2 Causes of session termination

In summary, session termination includes:

- Logoff/signoff
- /STOP DC
- Session failure not due to IMS, MVS, CEC or VTAM failure
- IMS shutdown

Chapter 4. Implementing VGR for IMS

Generic resources for IMS can be implemented quite easily using default settings, but care needs to be taken, as this may not be very practical in most IMS installations.

VTAM generic resources (VGR) can be used by IMS once this feature has been enabled within VTAM. In this chapter we will discuss briefly what needs to be in place in VTAM for VGR to be enabled. First, the requirements of VGR for IMS will be listed, and different components of VGR will be explained. This will be followed by an explanation of how to activate VGR within IMS.

4.1 Requirements for using VGR in IMS

- IMS version 6: Ideally, the following list of APARs should have been included in your IMS system:
  - PN92039 - Cannot start same ISC session from either side.
  - PQ05008 - A parallel ISC session will hang if system is XRF.
  - PQ18590 - IMS VGR support does not always reset affinity.
  - PQ18801 - Logons may be routed to IMS after joining the VGR group at initialization, but is only enabled at "`/START DC`".
  - PQ24902 - Add VGR RSR compatibility.
  - PQ25969 - After PQ18801 "`/START VGRS`" does not occur after "`/START DC`".
  - PQ26288 - IMS VGR support uses synchronous VTAM API, resulting in the IMS control region hanging.

  Please check with your IBM support for any needed fixes.
- MVS/ESA version 5 release 1
- MVS/ESA version 5 release 2 (for using WLM with VTAM)
- Parallel Sysplex environment
- ACF/VTAM version 4 release 2
- Advanced Peer-to-Peer Networking (APPN) protocol

4.2 VTAM components of VGR

For VGR to be enabled in VTAM, the following should be in place:

- VTAM start option parameter
- Coupling Facility structure
- VGR resolution exit

4.2.1 VTAM start option parameter

This name identifies the Coupling Facility structure to VTAM and can be specified in VTAM's STRGR start option parameter. The name of this structure defaults to ISTGENERIC.

4.2.2 Coupling Facility structure

This structure and its attributes need to be defined in the active Coupling Facility Resource Management (CFRM) policy for the sysplex.

Information about the generic resource group and individual terminals, logged on through the group, is stored in this structure. In this structure we find the VGR group name and the logon APPLID of each member application (with a session count). An additional table contains a list of affinities between session ID's (node names) and linked APPLIDs. A bit flag, in the structure, indicates whether IMS or VTAM has control over affinity management.

4.2.3 VGR resolution exit

This exit needs to be in a load library accessible by VTAM and, if allowed to follow its default processing algorithm, allows MVS Workload Manager (WLM) to determine session destination. See 5.1, "VGR resolution exit" on page 49 for a more detailed discussion and examples of implementation.

4.3 IMS components of VGR

The components of VGR within IMS consist of three parameters and two user exits. The exit usage is dependent on whether significant statuses (for terminals) need to be reset.

- IMS start-up parameter
- Affinity management parameter
- IMS ESTAE processing parameter
- Logoff/signoff user exits:

  These exits are not specific to VGR — they are standard IMS exits that can be used outside of a VGR environment.

4.3.1 IMS start-up parameter

IMS needs to be connected to a generic resource group. The name of this VGR group is specified on the GRSNAME parameter.

4.3.2 Affinity management parameter

Either IMS or VTAM can perform affinity management. The GRAFFIN parameter specifies whether IMS or VTAM should manage affinities in case of session failure.

4.3.3 IMS ESTAE processing parameter

If GRAFFIN=IMS was chosen (or defaulted to), then this parameter (in member DFSDCxxx) determines how IMS would handle affinities during abend processing.

4.3.4 Logoff/signoff user exits

These exits allow the removal of a significant status from either a static or an ETO terminal, as described in 5.2, "Logoff/signoff exits in IMS" on page 53.

4.4 Considerations when preparing for VGR

Before implementing VGR, you should ensure that IMS restrictions and user requirements are being adhered to, that the IMS environment is VGR capable, and that any required user education was provided.

4.4.1 Restrictions when using VGR for IMS connectivity

- The target of an MSC link cannot be a generic resource name.

  MSC links are replaced by Shared Queues (when implemented) and, if sessions are with IMS systems outside the generic group, real APPLIDs must be used.

- IMS systems participating in XRF cannot be members of a VGR group.

  VTAM does not allow an application to be known by both the GRSNAME and the XRF USERVAR.

- An IMS system cannot be a member of more than one VGR group.

4.4.2 User requirements

Changes may be required to bypass default processing in user exit modules, such as the VGR resolution exit and the IMS logoff/signoff exits. See Chapter 5, “Customizing VGR for IMS” on page 49.

You should determine what your GRSNAME is going to be and whether to code it as part of the DFSPBxxx member, or whether to use the "`/START VGRS`" command to join a VGR group. Next, you should decide, based on how your organization decided to handle affinities, on what the parameters for GRAFFIN and GRESTAE are going to be.

4.4.3 Environment

Ensure that all IMS systems have been generated from the same (or similar) source files to enable them to perform the same functions. In addition, all applications should be able to run on any of the IMS systems in the sysplex.

The above scenario would allow the different IMS systems to stand in for one another insofar as terminal/user logon and transaction execution is concerned. The end user would be presented with a view that is similar across all the different IMS platforms.

Applications that are used to log terminals onto IMS systems (now part of the generic group) should be changed to log them onto the chosen VGR group name. Ideally, terminals should not be dependent on a communication session with any specific IMS.

4.4.4 User education

It may be necessary for the user to re-connect after a failure. Ideally, this would be to the same VGR group name as used before, but this might fail. Logging on directly to another IMS system’s APPLID may result in an affinity remaining on the first IMS (see Chapter 3, “Managing affinities and significant status” on page 25). The user would need to be made aware that re-connecting to the first IMS (after an unknown period) may result in re-establishing the significant status that existed at the time of failure.

Another possibility, following an IMS failure, would be for the user to retrieve messages asynchronously. This could happen in both a Shared Queue and non-Shared Queue environment.

In all the above scenarios, the end user should be educated to handle session re-connect as well as affinity management.

Note: *Automatic (non-user intervention) management of affinities and the resolving of significant statuses by using IMS parameters and customizing the signoff and/or logoff exits would greatly reduce the amount of user education that would need to be done.*

4.4.5 Possible implementation methodology

A VTAM USERVAR can be assigned to an existing IMS APPLID in the sysplex and have the same name as the VGR group name decided on. This can be used as an interim measure to allow applications to change before VGR is implemented, and yet allow the system to operate as normal.

Prior to implementing VGR, this USERVAR can be assigned to any other IMS in the sysplex and, after a suitable test period, assigned to the others. This would highlight any application program constraints.

This allows for the phasing in of VGR instead of a "big bang" approach. Then, when implementing VGR, the USERVAR can be deleted, and the VGR group name assumes the position of the VTAM USERVAR.

Note... *A GRS name cannot be the same name as any existing ACB name or USERVAR in VTAM. The USERVAR being discussed here is a VTAM term, and should not be confused with the IMS start-up parameter USERVAR (user name of active IMS system for Remote Site Recovery).*

4.5 VTAM preparation for VGR

It is the function of VTAM to attach the sysplex environment to the network. In order to use the generic resource function, the application, participating in the generic resource group, must be running on a processor in the sysplex, and each VTAM must be connected to the Coupling Facility in which the generic resource structure has been allocated.

4.5.1 Network requirements

- All VTAMs in the sysplex must be defined as APPN network nodes or end nodes.
- Generic resource names must be unique within a single network:

  A generic resource name cannot be identical to a USERVAR name/id within VTAM, an alias name, or a real LU name.
- Consult your VTAM system programmer to verify that the network is VGR capable. The requirements can be found in the network implementation guide, entitled *OS/390 V2R7.0 eNetwork CS SNA Implementation Guide,* SC31-8563.

4.5.2 Tasks related to generic resource implementation

Before activating VGR for IMS, generic resources should be enabled within VTAM. Your VTAM system programmer needs to ensure that VTAM knows which Coupling Facility structure to access, and that APPN is the network protocol being used. Certain tasks need to be performed, and sizing calculations need to be made. The following tasks are the responsibility of the VTAM systems programmer:

- Ensure that the XCF functions exist in the sysplex.
- Ensure that the APPN protocol is available.
- Determine the Coupling Facility structure (default name ISTGENERIC) attributes:

  See topic 6.1.1.1 in the *OS/390 V2R7.0 eNetwork CS SNA Implementation Guide*, SC31-8563.
- Calculate the size of the Coupling Facility structure:

  Roughly 300 bytes per session is required in the structure. The requirements for IMS need to be added to those of any other users of VGR. Topic 6.1.1.2 of *OS/390 V2R7.0 eNetwork CS SNA Implementation Guide*, SC31-8563, can be referred to in this regard.
- Define the generic resource structure (ISTGENERIC) in the active CFRM policy and ensure that it can be rebuilt:

  See topic 4.4 of *OS/390 V2R7.0 MVS Setting Up a Sysplex*, GC28-1779.
- Ensure that the parameter STRGR is specified with a structure name (or allowed to default to ISTGENERIC) in the VTAM start options.
- Change, assemble, link-edit, and test the VGR resource resolution exit:

  See topic 5.1, “VGR resolution exit” on page 49 in this redbook for examples.

4.6 IMS preparation for VGR

VGR can be activated in IMS by adding three parameters used in IMS start-up. The IMS PROCLIB members containing these changes are DFSDCxxx and DFSPBxxx.

DFSDCxxx is new in IMS version 6.1, and is used in the implementation of Shared Queues (to override MTO names among other things) and VGR. Its 3-character suffix is specified in the DFSPBxxx member.

4.6.1 IMS parameters for VGR

The IMS parameters for VGR are listed below and will be discussed in turn.

- GRSNAME=aaaaaaaa

  This parameter specifies the name (8 characters) of the generic group that IMS must become part of. It can be specified in the DFSPBxxx member, or it can be specified by issuing the start VGR command from within IMS.

  Recommendation: *Use DFSPBxxx member — when using the VGRS start command, mentioned above, an incorrectly typed entry would require IMS to be shut down and re-started.*

- GRAFFIN=IMS | VTAM

  This parameter (added to member DFSDCxxx) specifies whether IMS or VTAM should manage affinities in case of session failure (GRAFFIN=IMS is the default). If VTAM does affinity management, any session failure would result in removal of the significant status.

  When the responsibility for affinity management lies with IMS, another parameter, GRESTAE (see below) and the logoff/signoff exits may influence how or when IMS handles affinities.

- GRESTAE=Y | N

  This parameter is also specified in member DFSDCxxx. It determines whether IMS should bypass the VGR logic, for each individual terminal, in the IMS ESTAE exit at termination time. GRESTAE=Y (the default) indicates that existing logic (to delete affinity for all nodes where no status remains and to close the VTAM ACB) should continue. GRESTAE=N specifies that IMS should close the VTAM ACB immediately (to expedite IMS termination) and leave affinity set for all nodes.

  This parameter is ignored when GRAFFIN=VTAM was specified.

4.6.2 Activating VGR for IMS

The following steps must be followed when defining IMS to participate in a generic resource group:

- MVS / VTAM preparation must be done.

  Ensure that the tasks discussed in 4.5.2, “Tasks related to generic resource implementation” on page 45 have been implemented.

- Update the DFSPBxxx member in the IMS PROCLIB.

  Specify DC=xxx to tell IMS what the 3-character suffix for the DFSDCxxx member would be. Add the GRSNAME=aaaaaaaa parameter (if you decided to have the GRSNAME as a hardcoded parameter) to specify the resource group name.

- Update DFSDCxxx member in the IMS PROCLIB.

  If Shared Queues has not been implemented yet, this member may not yet exist, and should be created first. Add the GRAFFIN and GRESTAE parameters to indicate to IMS your preference for affinity management and ESTAE processing.

- Add or modify the logoff and/or signoff user exits.

  These exits should be included if the significant status of a static or an ETO terminal needs to be reset at session termination time.

- Start IMS.

  A warm start of IMS is sufficient to activate the VGR parameters within IMS. An IMS start command, to specify the GRSNAME, may need to be done if the GRSNAME parameter was not added to the DFSPBxxx IMS PROCLIB member.

  Recommendation: *Cold start IMS (after a normal shutdown was done) to ensure cleanup of all significant statuses.*

4.6.3 De-activating VGR for IMS

An IMS can be taken out of its chosen generic resource group by issuing an IMS stop command, "/STOP VGR". A display active command would show the generic resource as being in a stopped state. In this scenario, any existing sessions with IMS remains, but no new logons will happen through the generic group name.

A start command, /START VGR, would allow the IMS to rejoin the VGR group. The GRSNAME parameter does not need to be re-specified on the start command that follows the stop command.

4.6.4 Backing out VGR for IMS

For a permanent de-activation of VGR, the GRSNAME, GRAFFIN and GRESTAE parameters must be taken out, and any changes to the logoff/signoff exits backed out. This should be followed by cycling IMS. IMS should be taken down with the /CHE ... LEAVEGR command to ensure a removal of all affinities to that IMS.

Chapter 5. Customizing VGR for IMS

Any exit routine definitions or modifications should be consistent across the different members of a VGR group. This ensures that there will be no exit routine related processing disruptions or confused terminal users.

Note: *The coding shown in this chapter may not necessarily be the most efficient or applicable to all environments. Generally, the checking of individual terminal types, to differentiate between alternate sets of processing logic, would be done using IMS/VTAM supplied information, and/or making use of site-specific naming standards. Our intention is to present what can be done to customize VGR for IMS and, where possible, show how we did it.*

The IMS user may prefer not to use the default mechanisms in determining which application a session is logged on to. The VTAM Generic Resource (VGR) resolution exit allows the user to control which VGR group member is selected.

Other exits that may be utilized are the logoff and signoff exits within IMS. These exits may be used in resetting the significant status (such as response or conversation mode) for individual terminals.

5.1 VGR resolution exit

The VGR resolution exit, ISTEXCGR, can be used as an alternative decision maker in determining which application (which IMS Transaction Manager, in our case) should best handle the requested session. This exit is invoked after VTAM has made a selection based on session balancing, and the workload manager (WLM) has made another (or possibly the same) selection.

Information passed to the exit is in parameter list format and can be expanded by using macro ISTGREPL. This list includes information such as VTAM's choice of application, WLM's selection, and a complete list of application instances, with their respective session counts.

WLM would make its decision based on CPU load balancing, and VTAM would attempt to maintain a balanced session count between the different applications. For our exercise we switched WLM off (by modifying the exit, allowing the VTAM selection to take effect) to ensure sessions going to both IMS systems in the sysplex. The source code changes can be seen in Figure 14.

```
GENRSCRS DS    0H                      BEGIN RESOLUTION
*
         MVC   GRREXIT,NULL            EXIT CHOICE = NULL
************************************************
***   START OF CHANGES
************************************************
*
****************************************
***   CHECK IF OUR IMS GENERIC RESOURCE
****************************************
         CLC   GRRGRNAM,=C'SCSIM6SJ'   OUR IMS GR NAME ?
         BE    BLDRSCRS                YES - CHANGE WLM'S
********************************
***   DO NOT CHANGE ANYTHING
********************************
         OI    GRRFLAG1,GRRFWLMX       TURN ON CALL WLM
         B     GOTRSCRS
*
BLDRSCRS DS    0H                      USE VTAM'S CHOICE
*
         NI    GRRFLAG1,255-GRRFWLMX   TURN OFF CALL WLM
*
GOTRSCRS DS    0H                      GOT RESOLUTION
*
************************************************
***   END OF CHANGES - FOLLOWING LINE WAS REPLACED
************************************************
*        OI    GRRFLAG1,GRRFWLMX       TURN ON CALL WLM
*
```

Figure 14. VGR exit: VTAM's session balancing

5.1.1 Considerations when using the VGR resolution exit

We had to ensure that the exit uses default processing for any VGR names other than the generic group name used in establishing connection with the IMSs in our testing environment. The same exit would be invoked when resolving generic session determination for TSO or CICS (if defined in a generic resource group), and the same resolution criteria may not apply to these different environments.

A hardcoded check for our IMS generic resource name (SCSIM6SJ) was built into the exit, and the default processing was allowed to occur when no match for this name was found.

5.1.2 Implementing the VGR resolution exit

Implementation of the exit involved the same steps mentioned in Chapter 8 of the redbook, *SNA in a Parallel Sysplex Environment*, *SG24-2113 .* The changed exit was linked as member YSTEXCGR into a load library accessible by VTAM (concatenated in the VTAM procedure), and a dynamic change was done (on every VTAM) to replace the default exit.

After the exit has been replaced, the VTAM display command "`D NET,EXIT`" can be used to verify that the change was done. This can be seen in Figure 15, where the active module for the ISTEXCGR exit is being shown as YSTEXCGR.

```
D NET,EXIT
IST097I DISPLAY ACCEPTED
IST350I DISPLAY TYPE = EXIT 946
IST1250I NAME     LEVEL    MODULE      STATUS
IST1251I ISTCMMND ***NA***             INACTIVE
IST1251I ISTEXCUV ***NA*** ISTEXCUV    ACTIVE
IST1251I ISTEXCCS ***NA***             INACTIVE
IST1251I ISTEXCSD ***NA*** ISTEXCSD    ACTIVE
IST1251I ISTEXCAA ***NA*** ISTEXCAA    ACTIVE
IST1251I ISTEXCVR ***NA***             INACTIVE
IST1251I ISTEXCDM ***NA***             INACTIVE
IST1251I ISTEXCGR ***NA*** YSTEXCGR    ACTIVE
IST1251I ISTEXCPM ***NA***             INACTIVE
IST1454I 9 EXIT(S) DISPLAYED
IST314I END
```

Figure 15. VTAM: display of exits

The above example illustrates a temporary change to the exit. Once VTAM is recycled, it invokes the ISTEXCGR module, and if a permanent change is required, this module would have to be overwritten. This also implies that if the default exit is not overwritten and the changed exit is required, the dynamic replace needs to be redone after every VTAM recycle.

5.1.3 Testing the VGR resolution exit

The exit was tested in a Parallel Sysplex with two IMSs. Prior to changing the exit, logons were going to the second IMS, which was running on a CPU with more available processing power. WLM always selected the second IMS as the best one with which to establish a session.

After the exit change, any additional logons (to the VGR group) would alternate between the two IMS systems (they started with the same number of sessions). Directly logging on a number of sessions to the second IMS (bypassing the VGR group) then resulted in all VGR group logons going to the first IMS, until an equal number of sessions were reached.

5.1.4 Using the resolution exit with user-specified criteria

Occasionally the IMS user may require that neither VTAM nor WLM determines the session destination. This would typically happen in the case of individual terminals that need to connect to a specific IMS.

If you have a naming standard for your terminals that can be used to differentiate between applications and/or types of workload, it may be a requirement to route some terminals to specific IMS systems at session initiation. This can be done using either a different VGR group name as described in 1.5.3, “Scenario 3: multiple VGR groups” on page 5, or by using the VGR resolution exit if you do not want to limit the entire IMS system to one specific type of workload.

We decided to check for any terminal (logging on to the IMS VGR group) that ends with "031" as the last three characters of its name. This check was built into the exit, as can be seen in the source code extract in Figure 16, and implemented using the same mechanism as described in 5.1.2, “Implementing the VGR resolution exit” on page 50.

```
GENRSCRS DS    0H                      BEGIN RESOLUTION
*
         MVC   GRREXIT,NULL            EXIT CHOICE = NULL
*************************************************
***   START OF CHANGES
*************************************************
         OI    GRRFLAG1,GRRFUVX        CONTINUE TO CALL ME
****************************************
***   CHECK IF OUR IMS GENERIC RESOURCE
****************************************
         CLC   GRRGRNAM,=C'SCSIM6SJ'   OUR IMS GR NAME ?
         BE    CHECKLU                 YES - CHK SOME LU'S
*********************************
***   DO NOT CHANGE ANYTHING
*********************************
         OI    GRRFLAG1,GRRFWLMX       TURN ON CALL WLM
         B     GOTRSCRS
*
CHECKLU  DS    0H                      SPECIAL CASES OF LU ?
         CLC   GRRONAME+5(3),=C'031'   SOME SPECIAL LU ?
         BNE   BLDRSCRS                NO - CHANGE CHOICE
*
         L     R10,GRRLIST             PTR TO GR REAL INST.
         USING ISTGRIN,R10             SET UP ADDRESSABILITY
*
CHKLOOP  DS    0H                      FIND REQ. REAL INST.
*
         ST    R10,GRREXIT             SELECTION = CURRENT
         CLC   GRINRNAM,=C'SCSIM6XA'   CURRENT = IMSX ?
         BE    GOTRSCRS                YES - THEN EXIT
*
         L     R10,GRINNXTS            PTR TO NEXT REAL INST.
         LTR   R10,R10                 GOT SOMETHING ?
         BNZ   CHKLOOP                 YES
* /*******************************************************
* /*  BIG   OOOOOPS !!!                                  *
* /*  OUR SELECTION DOES NOT PARTICIPATE IN GR CURRENTLY  *
* /*  COULD BE DOWN OR JUST OUT OF THE GROUP              *
* /*******************************************************
* /*  WHATEVER - WE CANNOT SELECT IT FROM HERE            *
* /*     SO ... FAIL THE SESSION (SENSE CODE 0801002D)    *
* /*******************************************************
         L     R15,FULL40              FAIL THIS SESSION
         B     ENDFREEA                EXIT THIS MODULE
*
BLDRSCRS DS    0H                      USE VTAM'S CHOICE
*
         NI    GRRFLAG1,255-GRRFWLMX   TURN OFF CALL WLM
*
GOTRSCRS DS    0H                      GOT RESOLUTION
*************************************************
***   END OF CHANGES - FOLLOWING LINE WAS REPLACED
*************************************************
*        OI    GRRFLAG1,GRRFWLMX       TURN ON CALL WLM
```

Figure 16. VGR exit: user selection

We had to consider what to do when a user logs on, but the IMS to be logged on to, is not available. This could be as a result of the IMS being down or the VGR stop command ("/STOP VGRS") having been issued for that IMS. In such a case, the above code would deny the user a session.

Note: *An IMS that does not participate in the VGR group is not shown in the list of real instances passed to the VGR resource resolution exit.*

The above exit was tested in the same environment mentioned in 5.1.3, “Testing the VGR resolution exit” on page 51. The coding was done to always route certain terminals to the first IMS and use VTAM’s session balancing (as explained in 5.1.2, “Implementing the VGR resolution exit” on page 50) for any other terminal. After a number of direct logons to the first IMS, any following sessions (using the generic resource group name) were expected to be with the second IMS. The terminal ending in "031", however, was routed to the first IMS.

A repetition of the test, but with the first IMS not participating in the VGR group, resulted in the message shown in Figure 17 for the terminal ending in "031".

```
EMS1164E Pass mode logon request failed for application SCSIM6SJ
```

Figure 17. VGR exit: message when logon fails

The same message was received after the first IMS was taken down, and a logon through the VGR group name was attempted.

5.2 Logoff/signoff exits in IMS

All MSC links and LU 6.2 VTAM terminals cannot use these exits to request IMS to perform resetting of an individual terminal’s significant status. The following examples have been coded with no regard to terminal type or terminal name. In most installations, the type or name (or combination thereof) would determine whether a specific significant status should be reset.

The significant relationships that may be reset by the logoff/signoff exits are:

- Conversation: an EXIT command would be issued instead of a status reset
- Exclusive mode
- MFS test mode
- Preset mode
- Response mode
- Test mode

5.2.1 Logoff exit

The logoff exit, DFSLGFX0, cannot be used to reset an ETO terminal’s significant status, but should be used whenever a static terminal’s status needs to be reset at logoff processing. We decided to request IMS to reset (by issuing the "`/EXIT`" command) any conversations (a significant status) found on individual terminals. We then modified the default exit code accordingly. Any other significant statuses for the terminal would be left as is. An extract of the modified code can be seen in Figure 18.

```
* SET UP REGISTERS FOR USER EXIT
************************************************
         L     15,12(,1)      LOAD A(FUNC PARMLIST)
         L     9,0(,15)       A(CLB)
         L     11,4(,15)      A(SCD)
         L     0,8(,15)       A(USERTABLE)
*
********************************
* START OF CHANGES             *
********************************
         L     10,12(,15)         A(STATUS VECTOR)
         USING STATVEC,10
*
         MVC   STATOUT,STATIN     SETUP FOR "CONV" CHK
         NI    STATOUT,STATCONV   AND OUT ANYTHING ELSE
         CLI   STATOUT,STATCONV   "CONV" STATUS FOUND ?
         BE    ENDGOOD            YES - GET OUT
*
         XI    STATOUT,X'00'      ENSURE OUT STATUS = 0
*
ENDGOOD  DS    0H
********************************
* END OF CHANGES               *
********************************
*
************************************************
* RETURN TO CALLER WITH GOOD RETURN CODE
************************************************
*
         LA    15,0
```

Figure 18. Logoff exit: reset conversation status

This exit was tested with GRAFFIN=IMS and GRESTAE=Y in a Parallel Sysplex with two IMS systems. Terminal 1 was put into the system definition for both IMSs in the sysplex. Prior to changing the exit, a conversational transaction was done from terminal 1 (logged on through the VGR group name to IMSA), and the session was broken. When logging on again (by using the generic group name), terminal 1 was logged on to IMSA with a "CONV-ACT" status. Both IMS systems were re-cycled to implement the logoff exit, and the above-mentioned test cycle was repeated. This time there was no conversation active indication for terminal 1 (connected to IMSA before and after the session was broken).

Refer to the chapter on " Logoff Exit Routine (DFSLGFX0)" in the *IMS/ESA V6 Customization Guide*, SC26-8732, for more information.

5.2.2 Signoff exit

This exit should be used when requesting IMS to reset the significant status of an ETO terminal (it does no resetting for static terminals). We decided on the same code changes for this exit as those described for the *Logoff Exit Routine (DFSLGFX0).* A minor difference in the code was that a different function-specific parameter list was being passed to the exit. This can be seen in Figure 19, which shows the one-line difference (in retrieving the address for the status vector DSECT). Changes to the source code (supplied with IMS) were also added after the section setting up the registers for the user exit.

```
         L     10,20(,15)        A(STATUS VECTOR)
```

Figure 19. Signoff exit: reset conversation status

Similar tests to those described for the logoff exit were performed on ETO terminals connected to both IMS systems in the sysplex (through the VGR group). After the exit was changed, ETO terminals with an active conversation prior to a session failure did not have an active conversation status when re-connected.

Refer to the chapter on "Signoff Exit Routine (DFSSGFX0)" in the *IMS/ESA V6 Customization Guide*,SC26-8732, for more information.

Chapter 6. Operating in a VGR environment

When you install a new feature of IMS, such as VGR, you will need to determine if there are any changes to existing operating procedures, or if there are any new operating procedures that must be put in place. VGR should be transparent to the user, but there are some new procedures necessary to operate a VGR environment in IMS, such as:

- Starting VGR
- Stopping VGR
- Starting IMS
- Stopping IMS
- Removing affinities in VGR

All references to commands in the section below are explained in more detail in 6.6, “Command enhancements for VGR” on page 59.

6.1 Starting VGR

You can activate VGR in two ways: either using the GRSNAME parameter in the DFSPBxxx member, and bouncing IMS; or by issuing the `/START VGR GRSNAME` command. It is currently not possible to alter the GRSNAME while IMS is running. It would need a bounce of IMS. If the `/START VGR` command was entered and the GRSNAME was keyed in incorrectly, you would have to bounce IMS to remove the assignment to that VGR group to that IMS.

A generic resource name is dynamically allocated when activated, and does not need to be pre-defined to VTAM. Once the GRSNAME is activated, VTAM dynamically builds an entry in the Coupling Facility. As soon as terminals begin connecting to IMS using the VGR name, then affinities are created in the VGR table for that terminal to the IMS system that it is connecting to.

6.2 Stopping VGR

An IMS system can be removed from a VGR group by issuing the `/STOP VGR` command in IMS. This command prevents any new logons to that IMS if those terminals logging on use the GRS name, and have no affinity to that IMS.

If a static terminal was not connected to that IMS at the time the `/STOP VGR` command was issued, and the terminal has an affinity to that IMS, then the next logon to the GRS name connects the terminal to that IMS.

This command only prevents a terminal logging onto that IMS system using the VGR name if no affinity to that IMS exists for that terminal. The `/STOP VGR` command stops future connections to the IMS of any terminals logging onto the GRS name, but does not stop terminals from logging onto that IMS using the APPLID, nor any terminal that has an affinity to that IMS. The `/STOP VGR` command does not remove any terminal affinities to that IMS. See Figure 20 below, and the text that follows for a detailed description.

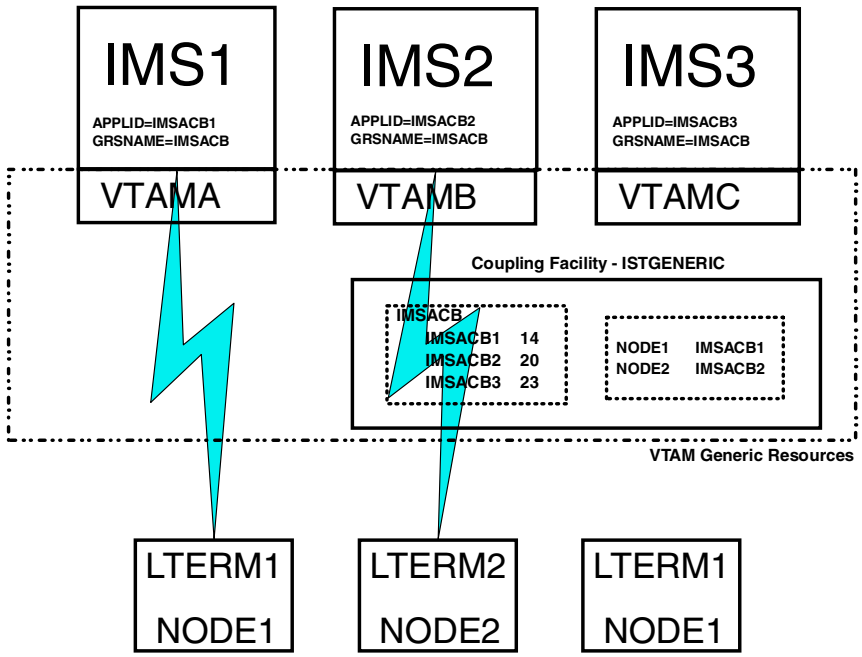

Figure 20. Example showing logon scenarios after /STOP VGR on IMS1

In the diagram above, consider the following:

- IMS1 has an APPLID of IMSACB1, IMS2 has an APPLID of IMSACB2, and IMS3 has an APPLID of IMSACB3. We are using session counts to determine which IMS the terminal should connect to.
- IMS1, IMS2 and IMS3 are all in the same VGR group defined with a GRSNAME of IMSACB.
- NODE1 is not currently logged on, but has an affinity to IMS1.
- A /STOP VGR command is issued from IMS1. IMS1 is no longer using VGR to balance sessions using WLM or even session counts to perform session balancing.
- NODE1 logs onto IMSACB, and because it has an affinity to IMSACB1, the logon is routed to IMS1, even though VGR has been stopped on IMS1. VTAM always honors an affinity.
- If NODE2 logs onto IMSACB, since VTAM is using session counts to distribute the logons, and since IMS1 is not available for new logons, NODE2 is logged onto IMS2. If IMS3 had a lower session count than IMS2, then NODE2 would have been logged onto IMS3.

If VTAM is managing sessions, and one of the VTAMs in a generic resource group abends, then another VTAM cleans up the affinities to the IMS associated with the VTAM failure for each terminal other than ISC links. Terminals that were in session though that VTAM to IMS at time of failure could logon again to the generic resource name and be routed to any available IMS system in the generic resource group.

6.3 Starting IMS

When IMS is cold started (or COLDCOMM), then **all** session affinities to the IMS are deleted at startup time.

If the GRSNAME parameter is specified in the DFSPBxxx PROCLIB member, then IMS joins the generic resource group during startup. After `/START DC` is performed, logons are routed to that IMS using the generic resource name.

6.4 Stopping IMS

IMS can be stopped with a `/CHE ... LEAVEGR` command. This shutdown checkpoint ensures that **all** affinities are deleted during shutdown.

6.5 Removing Affinities

If IMS is shutdown using the `/CHE .. LEAVEGR` command, all the affinities in the VGR table are deleted. The affinities deleted include those of LU0/FINANCIAL and ISC links.

If IMS is to be cold started, and IMS will be down for a long time, then it is advisable to bring down IMS with the LEAVGR parameter, so that all affinities to that IMS are deleted at shutdown time, instead of at IMS start-up time. LU0 and FINANCIAL terminals can then log on to any other active IMS system in the VGR group.

6.6 Command enhancements for VGR

With the introduction of VGR in IMS, changes have been made to assist in the operation of IMS. There are new parameters to existing commands to manage VGR for IMS. The output of some commands has also changed to include some VGR information. There are also commands in VTAM that might facilitate operating in a VGR environment. Commands are discussed in the following sections.

6.6.1 IMS commands

The commands that have specific information for a VGR environment are discussed briefly below. Refer to the *IMS/ESA Operators Reference Guide*, SC26-8742, for more information.

6.6.1.1 /DIS AFFIN NODE nodename

The `/DIS AFFIN` command retrieves information from the ISTGENERIC structure on the coupling facility. The terminal does not need to be attached to that IMS system that the command is issued on, for the information to be shown in the display. There are no wildcard characters in the display, or generic commands, nor is there an IMS command to display all the affinities.

In the example below, the display was issued for four node names on IMS2 (IMSACB2). Affinities were found for the first three nodes in the display; but for the fourth node, N/A is returned, because there was no entry in the affinity table for that node.

```
/DIS AFFIN NODE TCP38037 TCP38025 TCP38016 TCP38001


     NODE      APPLID
    NODE1     IMSACB1
    NODE2     IMSACB2
    NODE3     IMSACB2
    NODE99    N/A
    *99198/195913*
```

This command makes it easier to operate in a VGR environment. If a user has a problem with an IMS session, the `/DIS AFFIN` command can be issued on any IMS system in the same VGR group to find out which system the user is connected to. The operator can then know where to start looking at any of the users' problems.

If the data in the APPLID field is N/A, then there is no information in the ISTGENERIC structure in the coupling facility regarding that node.

6.6.1.2 /DIS ACTIVE

The GRSNAME, if one is specified or active, is included in the `/DIS ACTIVE` display. This command can be used to see what the GRSNAME is for a specific IMS as well as to show whether the VGR name is active or stopped for the IMS on which the command was entered.

The first example listing below shows that VGR is active, and the generic resource name for that IMS is IMSACB.

```
/DIS A DC
     VTAM STATUS AND ACTIVE DC COUNTS
    VTAM ACB OPEN          -LOGONS ENABLED
    IMSLU=N/A.N/A            APPC STATUS=DISABLED
    OTMA GROUP=N/A       STATUS=NOTACTIVE
    APPLID=IMSACB1   GRSNAME=IMSACB   STATUS=ACTIVE
    LINE ACTIVE-IN -    1 ACTIV-OUT -    0
    NODE ACTIVE-IN -    1 ACTIV-OUT -    0
    *99198/200918*
```

The second example listing below shows the output of the /DIS A DC command when a GRSNAME has not been specified during IMS start-up, or activated with a command.

```
/DIS A DC
      VTAM STATUS AND ACTIVE DC COUNTS
     VTAM ACB OPEN          -LOGONS ENABLED
     IMSLU=N/A.N/A            APPC STATUS=DISABLED
     OTMA GROUP=N/A       STATUS=NOTACTIVE
     APPLID=IMSACB2   GRSNAME=         STATUS=DISABLED
     LINE ACTIVE-IN -    1 ACTIV-OUT -    0
     NODE ACTIVE-IN -    1 ACTIV-OUT -    0
     *99176/170753*
```

The third example listing below shows an IMS system that has left the VGRG called IMSACB. You can see that VGR was disabled in IMS from the status of STOPPED in the display.

```
/DIS A DC


     VTAM STATUS AND ACTIVE DC COUNTS
    VTAM ACB OPEN          -LOGONS ENABLED
    IMSLU=N/A.N/A            APPC STATUS=DISABLED
    OTMA GROUP=N/A       STATUS=NOTACTIVE
    APPLID=IMSACB1   GRSNAME=IMSACB   STATUS=STOPPED
    LINE ACTIVE-IN -    1 ACTIV-OUT -    0
    NODE ACTIVE-IN -    1 ACTIV-OUT -    0
    *99176/165130*
```

6.6.1.3 /DIS APPC

This output has been changed to include a field to describe the generic resource group to which the APPC LU is connected to. There will only be a value in the generic resource group field, if VGR for APPC has been activated. VGR is defined for the specific APPC LUs in APPC, and is not in any way connected to IMS.

```
/DIS APPC

IMSLU             #APPC-CONV SECURITY STATUS   DESIRED GRNAME
ZABKD001.APCAIP01          0 FULL     ENABLED  ENABLED  APPCIMS
*99200/111626*
```

6.6.1.4 /CHECKPOINT ... LEAVEGR

The LEAVEGR keyword can only be used with a shutdown checkpoint. If this keyword is used on the shutdown command, then all the VTAM affinities to that IMS system are deleted from the VTAM affinity table. It is important to remember that the nodes or users might still have a significant status in IMS, even though the affinities have been deleted from the VTAM affinity table. It is recommended that a LEAVEGR should only be issued if the IMS DC system will be restarted with a cold start.

6.6.1.5 /START VGRS GRSNAME grsname

This command can be used to activate VGR if GRSNAME= is not specified in the DFSPBxxx member. This command can also be used to re-introduce the IMS to the VTAM generic resource group after it was removed using the /STOP VGRS command. This command is not executed if there are existing VTAM sessions with that IMS.

You must first issue a /CLSDST NODE command from a non-VTAM terminal (such as the system console) for any active VTAM terminals, including the MTO, before the command takes effect. If there are any VTAM terminals connected to IMS, the following error message is issued:

```
DFS3691W 17:12:11 GENERIC RESOURCES START/STOP FAILED, SETLOGON RC=14, FDB2=86
```

You must first issue a /CLSDST NODE command from a non-VTAM terminal (such as the system console) for any active VTAM terminals, including the MTO, before the command takes effect.

6.6.1.6 /STOP VGRS

The /STOP VGRS command can be used to remove an IMS from a VGR group. This does not prevent a terminal from logging onto the IMS using the APPLID name. A terminal that has an affinity for the IMS is able to logon to the IMS using the GRS name.

6.6.2 VTAM commands

6.6.2.1 /D NET,ID=

You can use this command to:

- Display all members of a generic resource group given a generic resource name
- Display generic resource name given the IMS APPLID

Display all members of a generic resource group

The VTAM display id command can be used to view the generic resource name used for logons and identify the members of the generic resource group.

In the display below, we issued command /D NET,ID=IMSACB, and it can be seen that IMSACB1 and IMSACB2 are members of the generic resource group IMSACB.

```
-D NET,ID=IMSACB
 IST097I DISPLAY ACCEPTED
 IST075I NAME = IMSACB  , TYPE = GENERIC RESOURCE
 IST1359I MEMBER NAME        OWNING CP   SELECTABLE  APPC
 IST1360I USIBMSC.IMSACB1    SC53M          YES       YES
 IST1360I USIBMSC.IMSACB2    SC47M          YES       YES
 IST924I -------------------------------------------------------------
 IST075I NAME = USIBMSC.IMSACB  , TYPE = DIRECTORY ENTRY
 IST1186I DIRECTORY ENTRY = DYNAMIC LU
 IST1184I CPNAME = USIBMSC.SC47M - NETSRVR = ***NA***
 IST314I END
```

If the generic resource name has been activated, but no members in the group are active, then a display like the one below could be seen.

```
D NET,ID=IMSACB
IST097I DISPLAY ACCEPTED
IST075I NAME = USIBMSC.IMSACB  , TYPE = DIRECTORY ENTRY
IST1186I DIRECTORY ENTRY = DYNAMIC LU
IST1184I CPNAME = USIBMSC.SC47M - NETSRVR = ***NA***
IST314I END
```

Displaying the IMS APPLID to show the generic resource name

If you display the IMS APPLID in VTAM once VGR has been activated, then you will see a line in the display indicating the generic resource name representing the member APPLID.

```
D NET,ID=IMSACB1
IST097I DISPLAY ACCEPTED
IST075I NAME = USIBMSC.IMSACB1 , TYPE = APPL 390
IST486I STATUS= ACT/S, DESIRED STATE= ACTIV
IST1447I REGISTRATION TYPE = CDSERVR
IST1363I GENERIC RESOURCE NAME IMSACB   REPRESENTS USIBMSC.IMSACB1
IST977I MDLTAB=***NA*** ASLTAB=***NA***
IST861I MODETAB=SCMODIMS USSTAB=***NA*** LOGTAB=***NA***
IST934I DLOGMOD=LU62APPC USS LANGTAB=***NA***
IST1632I VPACING =  7
IST597I CAPABILITY-PLU ENABLED  ,SLU ENABLED  ,SESSION LIMIT NONE
IST231I APPL MAJOR NODE = APIMS6Z
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST271I JOBNAME = IMSCTL1, STEPNAME = IMSCTL, DSPNAME = IST67ADB
IST1050I MAXIMUM COMPRESSION LEVEL - INPUT = 0, OUTPUT = 0
IST1633I ASRCVLM = 1000000
IST1634I DATA SPACE USAGE: CURRENT = 0 MAXIMUM = 0
IST171I ACTIVE SESSIONS = 0000000156, SESSION REQUESTS = 0000000000
IST314I END
```

Displaying affinities in VTAM

/D NET,GRAFFIN,GRNAME=xxx,,,,

This command is only available from OS/390 version 2.7 onwards. Information on the command can be found in *OS/390 V2R7.0 eNetwork CS SNA Operation* manual. Make sure that this command is used efficiently, otherwise there could be VTAM slowdowns as a result of the amount of information requested.

```
D NET,GRAFFIN,LU=AP512V91
IST350I  DISPLAY TYPE = GENERIC AFFINITY
IST1706I  PARTNER NAME       GENERIC RESOURCE    MEMBER     ATTRIBUTES
IST1707I  ZABKD001.AP512V91  ZABKD001.IMSV       IV02       -VG--W--
IST1454I           1 AFFINITY     DISPLAYED
IST314I  END
```

Appendix A. Special Notices

This publication is intended to help IMS systems programmers to set up IMS to use VTAM Generic Resources (VGR). The information in this publication is not intended as the specification of any programming interfaces that are provided by IMS. See the PUBLICATIONS section of the IBM Programming Announcement for IMS for more information about what publications are considered to be product documentation.

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Appendix B. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

B.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see “How to Get ITSO Redbooks” on page 69.

- *IMS/ESA Shared Queues: A Planning Guide*, SG24-5257
- *IMS/ESA V6 Parallel Sysplex Migration Planning Guide for IMS TM and DBCTL*, SG24-5461
- *IMS/ESA Version 6 Shared Queues*, SG24-5088
- *IMS/ESA Version 6 Guide*, SG24-2228-01
- *IMS/ESA Data Sharing in a Parallel Sysplex*, SG24-4303
- *IMS/ESA Sysplex Data Sharing: An Implementation Case Study*, SG24-4831
- *SNA in a Parallel Sysplex Environment*, *SG24-2113*

B.2 Redbooks on CD-ROMs

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at `http://www.redbooks.ibm.com/` for information about all the CD-ROMs offered, updates and formats.

CD-ROM Title	Collection Kit Number
System/390 Redbooks Collection	SK2T-2177
Networking and Systems Management Redbooks Collection	SK2T-6022
Transaction Processing and Data Management Redbooks Collection	SK2T-8038
Lotus Redbooks Collection	SK2T-8039
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AS/400 Redbooks Collection	SK2T-2849
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RS/6000 Redbooks Collection (BkMgr Format)	SK2T-8040
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037
IBM Enterprise Storage and Systems Management Solutions	SK3T-3694

B.3 Other Publications

These publications are also relevant as further information sources:

- *OS/390 eNetwork Communications Server: SNA Customization*, LY43-0110
- *OS/390 V2R7.0 eNetwork CS SNA Implementation Guide, SC31-8563*
- *OS/390 V2R7.0 MVS Setting Up a Sysplex*, GC28-1779
- IMS/ESA *Operators Reference Guide*, SC26-8742
- *IMS/ESA V6 Customization Guide*, SC26-8732
- *OS/390 V2R6.0 MVS Planning: APPC/MVS Management*, GC28-1807

How to Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, redpieces, and CD-ROMs. A form for ordering books and CD-ROMs by fax or e-mail is also provided.

- **Redbooks Web Site** `http://www.redbooks.ibm.com/`

  Search for, view, download, or order hardcopy/CD-ROM redbooks from the redbooks Web site. Also read redpieces and download additional materials (code samples or diskette/CD-ROM images) from this redbooks site.

  Redpieces are redbooks in progress; not all redbooks become redpieces and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

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In United States	usib6fpl@ibmmail.com
Outside North America	Contact information is in the “How to Order” section at this site: `http://www.elink.ibmlink.ibm.com/pbl/pbl/`

- **Telephone Orders**

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Canada (toll free)	1-800-IBM-4YOU
Outside North America	Country coordinator phone number is in the “How to Order” section at this site: `http://www.elink.ibmlink.ibm.com/pbl/pbl/`

- **Fax Orders**

United States (toll free)	1-800-445-9269
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Outside North America	Fax phone number is in the “How to Order” section at this site: `http://www.elink.ibmlink.ibm.com/pbl/pbl/`

This information was current at the time of publication, but is continually subject to change. The latest information may be found at the redbooks Web site.

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Glossary

A

advanced program-to-program communication (APPC). (1) IBM's architected solution for program-to-program communication, distributed transaction processing, and remote database access. A transaction program (TP) using the APPC API can communicate with other TPs on systems that support APPC. (2) An implementation of the Systems Network Architecture (SNA) logical unit (LU) 6.2 protocol that enables interconnected systems to communicate and share the processing of programs.

API. See application program interface.

applet. An applet is a piece of Java bytecode that is executed on the workstation, under control of the Web browser's Java Virtual Machine. The applet is downloaded when the browser accesses a page containing an <APPLET> tag.

application. (1) The use to which an information processing system is put; for example, a payroll application or an order-entry application. (2) A collection of defined and extended classes that provides a reusable piece of functionality. An application contains and organizes functionally related classes. It also can contain subapplications and specify prerequisites.

application program interface (API). An architected functional interface supplied by an operating system or other software system. The interface enables an application program written in a high-level language to use specific data or functions of the underlying system.

ASCII. (American Standard Code for Information Interchange), this is the world-wide standard for the code numbers used by computers to represent all the upper and lower-case Latin letters, numbers, punctuation, etc. There are 128 standard ASCII codes each of which can be represented by a 7-digit binary number, 0000000 through 1111111.

authority. The right to do something on the system or to use an object, such as a file or document, in the system.

authorization list. A list that gives a group of users one or more types of access to objects (such as files or programs) or data in the objects (such as records in a file). It consists of a list of two or more user IDs and their authorities for system resources.

B

bandwidth. How much stuff you can send through a connection, usually measured in bits per second. A full page of English text is about 16,000 bits.

Base Primitive Environment (BPE). A system service component that underlies the HWS address space.

baud. In common usage the baud rate of a modem is how many bits it can send or receive per second. Technically, baud is the number of times per second that the carrier signal shifts value; for example a 1200 bit/second modem actually runs at 300 baud, but it moves 4 bits per baud. See also bit, modem.

bit. (binary digit) A single digit number in base 2, in other words, either a 1 or a zero. The smallest unit of computerized data. *Bandwidth* is usually measured in bits per second. See also bandwidth, BPS, byte, kilobyte, megabyte.

BPS. (bits per second) A measurement of how fast data is moved from one place to another. ie. A 28.8 modem can move 28,800 bits per second. See also bandwidth, bit.

browser. Software that enables users to browse through the cyberspace of the World Wide Web. See also Client, URL, WWW.

byte. A set of bits that represent a single character. Usually there are 8 bits in a byte, sometimes more, depending on how the measurement is being made.

C

CGI Link. A stand-alone executable program that receives incoming CGI requests and routes them to the VisualAge application. CGI Link runs on the HTTP server, which does not have to be the same as the machine running the VisualAge application.

CGI query. A special kind of HTTP request from a client browser requesting that a server-based program be run. A CGI query specifies the name of the program to run, along with any input parameters. See also *Common Gateway Interface*.

client. A software program that is used to contact and obtain data from a server software program on another computer, often across a great distance. Each client program is designed to work with one or more specific kinds of server programs, and each server requires a specific kind of client. A Web browser is a specific kind of client. See also browser, server.

client/server. The model of interaction in distributed data processing in which a program at one location sends a request to a program at another location and awaits a response. The requesting program is called a client, and the answering program is called a server.

Common Gateway Interface. A standard protocol through which a Web server can execute programs running on the server machine. CGI programs are executed in response to requests from Web client browsers.

Common User Access (CUA). An IBM architecture for designing graphical user interfaces that uses a set of standard components and terminology.

configuration. A description of a group of components that identifies, for each component, the component edition or version that is part of the group.

D

database manager. other word for a database management system.

datastore. An IMS TM system that provides transaction and database processing.

domain name. The unique name that identifies an Internet site. Domain names always have two or more parts, separated by dots. The part on the left is the most specific, and the part on the right is the most general. A given machine may have more than one domain name but a given domain name points to only one machine. Usually, all of the machines on a given network will have the same thing as the right-hand portion of their domain names, for example, gateway.mynetwork.com.br, mail.mynetwork.com.br, www.mynetwork.com.br, and so on. It is also possible for a domain name to exist but not be connected to an actual machine. This is often done so that a group or business can have an Internet e-mail address without having to establish a real Internet site. In these cases, some real Internet machine must handle the mail on behalf of the listed domain name. See also IP Number.

dynamic link library (DLL). A file containing data and code objects that can be used by programs or applications during loading or at run time but are not part of the program's executable (.EXE) file.

E

e-mail. (Electronic mail) Messages transmitted over the Internet from user to user. E-mail can contain text, but also can carry with it files of any type as attachments.

F

feature. A major component of a software product that can be ordered separately.

field. A group of related bytes (such as name or amount) that are treated as a unit in a record.

firewall. A combination of hardware and software that protects a local area network (LAN) from Internet hackers. It separates the network into two or more parts and restricts outsiders to the area outside the firewall. Private or sensitive information is kept inside the firewall.

first-in first-out (FIFO). A queuing technique in which the next request to be processed from a queue is the request of the highest priority that has been on the queue for the longest time.

form. An HTML element that can include entry fields, push buttons, and other user-interface controls through which users can enter information. Sometimes called a *fill-in form.*

FTP. (File Transfer Protocol) The basic Internet function that enables files to be transferred between computers. You can use it to download files from a remote, host computer, as well as to upload files from your computer to a remote, host computer. (See Anonymous FTP).

G

gateway. A host computer that connects networks that communicate in different languages. For example, a gateway connects a company's LAN to the Internet.

GIF. (Graphics Interchange Format) A graphics file format that is commonly used on the Internet to provide graphics images in Web pages.

Gopher. Gopher is a facility that helps you find resources on the Internet. Gopher presents you simple based menus. Each menu item represents either another Gopher menu, or can take you directly to facilities or services such as viewing or down-loading files, or starting a Telnet session. Because Gopher menus could point to other Gopher servers, you can search for resources across the whole Internet system.

graphical user interface (GUI). A type of interface that enables users to communicate with a program by manipulating graphical elements rather than by entering commands. Typically, a graphical user interface includes a combination of graphics, pointing devices, menu bars, overlapping windows, and icons.

H

host. (1) A computer that "hosts" outside computer users by providing files, services or sharing its resources. (2) Any computer on a network that is a repository for services available to other computers on the network. It is quite common to have one host machine provide several services, such as *WWW* and *USENET*. See also Node, Network.

Host Web Service (HWS). An other short name for ITOC. It is also the prefix of the module and messages. This short name indicates that only Web clients can use it, but it is not exact: any TCP/IP client can connect to IMS through HWS.

HTML (hypertext markup language). The basic language that is used to build hypertext documents on the World Wide Web. It is used in basic, plain ASCII-text documents, but when those documents are interpreted (called rendering) by a Web browser such as Netscape, the document can display formatted text, color, a variety of fonts, graphic images, special effects, hypertext jumps to other Internet locations and information forms.

HTTP (hypertext transfer protocol). The protocol for moving hypertext files across the Internet. Requires a HTTP client program on one end, and an HTTP server program on the other end. HTTP is the most important protocol used in the World Wide Web (WWW). See also Client, Server, WWW.

HTTP request. A transaction initiated by a Web browser and adhering to HTTP. The server usually responds with HTML data, but can send other kinds of objects as well.

hypertext. Text in a document that contains a hidden link to other text. You can click a mouse on a hypertext word and it will take you to the text designated in the link. Hypertext is used in Windows help programs and CD encyclopedias to jump to related references elsewhere within the same document. The wonderful thing about hypertext, however, is its ability to link - using HTTP over the Web - to any Web document in the world, yet still require only a single mouse click to jump clear around the world.

I

icon. A small pictorial representation of an object.

index. A set of pointers that are logically arranged by the values of a key. Indexes provide quick access and can enforce uniqueness on the rows in a table.

Internet. The vast collection of interconnected networks that all use the TCP/IP protocols and that evolved from the ARPANET of the late 1960's and early 1970's.

intranet. A private*network* inside a company or organization that uses the same kinds of software that you would find on the public *Internet*, but that is only for internal use. As the Internet has become more popular, many of the tools used on the Internet are being used in private networks, for example, many companies have Web servers that are available only to employees.

IP. (Internet Protocol) The rules that provide basic Internet functions. See TCP/IP.

IP Number. An Internet address that is a unique number consisting of four parts separated by dots, sometimes called a *dotted quad*. (For example: 198.204.112.1). Every Internet computer has an IP number and most computers also have one or more domain names that are plain language substitutes for the dotted quad.

ISDN (Integrated Services Digital Network). A set of communications standards that enable a single phone line or optical cable to carry voice, digital network services and video. ISDN is intended to eventually replace our standard telephone system.

ITOC (IMS TCP/IP OTMA Connection). The IBM provided software that acts as an OTMA bridge between IMS/OTMA and TCP/IP. Its main use is to connect IMS with the internet.

J

Java. Java is a programming language invented by Sun Microsystems that is specifically designed for writing programs that can be safely downloaded to your computer through the Internet and immediately run without fear of viruses or other harm to your computer or files. Using small Java programs (called *applets*, Web pages can include functions such as animations, calculators, and other fancy tricks. We can expect to see a huge variety of features added to the Web using Java, since you can write a Java program to do almost anything a regular computer program can do, and then include that Java program in a Web page.

Java Beans. Java Beans is a set of APIs that make it easy to create Java applications from reusable components. It is a platform-neutral, component-based software architecture for the Java Platform and is device and operating system independent.

Java Bytecode. The solution that the Java system adopts to solve the binary distribution problem is a "binary code format" that's independent of hardware architectures, operating system interfaces, and window systems. The format of this system-independent binary code is architecture neutral.

Java Classes. A class is a software construct that defines the data (state) and methods (behavior) of the specific concrete objects that are subsequently constructed from that class. In Java terminology, a class is built out of members, which are either fields or methods.

Java Packages. Java packages are collections of classes and interfaces that are related to each other in some useful way. Such classes need to be able to access each other's instance variables and methods directly.

JavaScript. JavaScript is an easy-to-use object scripting language designed for creating live online applications that link together objects and resources on both clients and servers.

JITOC. The IMS TCP/IP OTMA Connection Connector for Java is a set of Java beans which provide a way to create Java applications that can access IMS transactions. The ITOC Connector for Java provides a Common Connector Framework-compliant Java interface to ITOC.

JPEG. (Joint Photographic Experts Group) The name of the committee that designed the photographic image-compression standard. JPEG is optimized for compressing full-color or gray-scale hotographic-type, digital images. It doesn't work well on drawn images such as line drawings, and it does not handle black-and-white images or video images.

K

kbps. (kilobits per second) A speed rating for computer modems that measures (in units of 1024 bits) the maximum number of bits the device can transfer in one second under ideal conditions.

kilobyte. A thousand bytes. Actually, usually 1024 bytes. See also byte, bit.

L

LAN. Local area network. A computer network located on a user's establishment within a limited geographical area. A LAN typically consists of one or more server machines providing services to a number of client workstations. See also Ethernet.

listserv. An Internet application that automatically serves mailing lists by sending electronic newsletters to a stored database of Internet user addresses. Users can handle their own subscribe/unsubscribe actions without requiring anyone at the server location to personally handle the transaction.

Login. The account name used to gain access to a computer system. Not kept secret (unlike password).

M

Mail. The Internet provides electronic mail using the Simple Mail Transfer Protocol (SMTP) and Post Office Protocol (POP). Most electronic mail services provide a gateway to Internet mail so if you have access to Internet mail you E-Mail access to millions of people. A new standard called Multipurpose Internet Mail Extension (MIME) allows you now to send mail that includes binary and multimedia objects.

megabyte. A million bytes. A thousand kilobytes. See also byte, bit, kilobyte.

MIME. (Multipurpose Internet Mail Extensions) A set of Internet functions that extend normal e-mail capabilities and enable nontext computer files to be attached to e-mail. Nontext files include graphics, spreadsheets, formatted word-processor documents, sound files, and so on. Files sent by MIME arrive at their destination as exact copies of the original so that you can send fully formatted word processing files, spreadsheets, graphics images and software applications to other users via simple e-mail. Besides email software, the MIME standard is also universally used by Web servers to identify the files they are sending to Web clients, in this way new file formats can be accommodated simply by updating the browsers' list of pairs of MIME types and appropriate software for handling each type. See also browser, client, server.

N

News. Internet News (also called Usenet) is a discussion or conferencing facility. Thousands of different news groups cover almost any subject you can imagine.

notebook. A view that resembles a bound notebook, containing pages separated into sections by tabbed divider pages. A user can turn the pages of a notebook or select the tabs to move from one section to another.

O

object-oriented programming. A programming methodology built around objects and based on sending messages back and forth between those objects. The basic concepts of object-oriented programming are encapsulation, inheritance, and polymorphism.

Open Transaction Manager Access (OTMA). A transaction-based connectionless client/server protocol using XCF as communication vehicle.

P

parameter. A data element included as part of a message to provide information that the object might need. In Smalltalk, generally referred to as an argument.

password. A code used to gain access to a locked system. Good passwords contain letters and nonletters and are not simple combinations.

PATH_INFO. A CGI variable, usually transmitted to the CGI program in the form of an environment variable. The PATH_INFO variable contains all path information from the URL following the name of the CGI executable. For a Web Connection application, this information is the same as the VisualAge part name.

Port. (1) A place where information goes into or out of a computer, or both. For example, the serial port on a personal computer is where a modem would be connected. (2) On the Internet port often refers to a number that is part of a URL, appearing after a colon (:) right after the domain name. Every *service* on an Internet server listens on a particular port number on that server. Most services have standard port numbers; Web servers normally listen on port 80. Services can also listen on nonstandard ports, in which case the port number must be specified in a URL when accessing the server. (3) Refers to translating a piece of software to bring it from one type of computer system to another. See also domain name, server, URL. (4) In the case of ITOC, HWS address space represents several port numbers; each port will provide access to one of a number of sockets associated with the IMS Transaction Manager systems HWS is connected to.

POST. One of the methods used in HTTP requests. A POST request is used to send data to an HTTP server. See also GET.

protocol. (1) The set of all messages to which an object will respond. (2) Specification of the structure and meaning (the semantics) of messages that are exchanged between a client and a server. (3) Computer rules that provide uniform specifications so that computer hardware and operating systems can communicate. It's similar to the way that mail, in countries around the world, is addressed in the same basic format so that postal workers know where to find

the recipient's address, the sender's return address and the postage stamp. Regardless of the underlying language, the basic protocols remain the same.

proxy. An application gateway from one network to another for a specific network application like Telnet of FTP, for example, a firewall's proxy Telnet server performs authentication of the user and then lets the traffic flow through the proxy as if it were not there. Function is performed in the firewall and not in the client workstation, causing more load in the firewall. Compare with socks.

R

receiver. The object that receives a message. Contrast with sender.

record. A group of related data, fields, or words, treated as a unit, such as name, address, and telephone number.

repository. (1) An organized, shared body of information that can support business and data-processing activities.

reset button. A type of push button that can appear on a form. A reset button restores all input fields to their default states.

return value. An object or data type that a receiver object passes to a sender object in response to a message.

router. A network device that enables the network to reroute messages it receives that are intended for other networks. The network with the router receives the message and sends it on its way exactly as received. In normal operations, they do not store any of the messages that they pass through.

S

script. A series of commands that define the sequence in which they will have to be processed.

sender. An object that sends a message to another object. On the level of code implementation, the sender is considered to be the sending method within the class or instance that issues the message. Contrast with receiver.

server. (1) A computer that provides services to multiple users or workstations in a network; for example, a file server, print server, or mail server. (2) An object that performs one or more tasks on behalf of a client. The server can be a computer (a file server), a specific process on a server, or a distributed object. A single server machine could have several different server software packages running on it, thus providing many different servers to clients on the network. See also client, network.

service. A specific behavior that an object is responsible for exhibiting.

servlet. A servlet is a piece of Java code that runs inside a Java-enabled Web server, such as the Lotus Domino Go Webserver Release 4.6.1or IBM HTTP Server 1.3.3 with IBM WebSphere Application Server V2.0, and extends the functions of the server. The server hands requests to the servlet, which replies to them. Servlets are a good substitute for CGI programs because they are faster and more easily manageable.

session. A series of commands that come from the same client and belong to the same logical sequence and period. A session is identified by a unique session key, which is generated by VisualAge. A session begins when a client initially connects (without a session key) and ends when a specified timeout period has elapsed since the last connection.

socket. An end-point to which clients can connect. This address is unique on the entire network. The connection between two sockets provides a full duplex communication path between the two end processes.

socks. Software to intercept and redirect all TCP/IP requests at the firewall. It handles data to and from applications such as Telnet, FTP, Mosaic, and Gopher. Provides users in a secured network access to resources outside the network by directing data through the firewall. Firewall users must use client programs specifically designed to work with the *sock* server.

structured query language (SQL). A language used to access relational databases.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

T

TCP/IP. (Transmission Control Protocol/Internet Protocol) The basic programming foundation that carries computer messages around the globe via the Internet. The suite of protocols that defines the Internet. Originally designed for the UNIX operating system, TCP/IP software is now available for every major kind of computer operating system. To be truly on the Internet, your computer must have TCP/IP software.

Telnet. An Internet protocol that lets you connect your PC as a remote workstation to a host computer anywhere in the world and to use that computer as if you were logged on locally. You often have the ability to use all of the software and capability on the host computer, even if it's a huge mainframe.

U

uniform resource locator (URL). A standard identifier for a resource on the World Wide Web, used by a Web browser to initiate a connection. The URL includes the communications protocol to use, the name of the

server, and path information identifying the object to be retrieved on the server. A URL looks like : *http://www.matisse.net/seminars.html.br*, or *telnet://well.sf.ca.us.br*, or *news:new.newusers.questions.br*

user profile. A file that contains the user's password, the list of special authorities assigned to a user, and the objects the user owns. It is used by the system to verify the user's authorization to read or use objects, such as files or devices, or to run the jobs on the system. Each user profile must have a unique name.

V

variable. A storage place within an object for a data element. The data element is an object, such as a number or date, stored as an attribute of the containing object.

W

WAN. (Wide Area Network). Any internet or network that covers an area larger than a single building or campus. See also Internet, LAN, network.

Web Browser. As many other Internet facilities, the Web uses a client-server processing model. The Web browser is the client component. Examples of Web browsers include Mosaic, Netscape and the IBM WebExplorer. The Web browser is responsible for formatting and displaying information, interacting with the user and invoking external viewers for data types that it doesn't support directly.

Web Server. Web servers are responsible for servicing requests for information from Web browsers. The information can be a file retrieved from the servers local disk or generated by a program called by the server to perform a specific application function.

window. A rectangular area of the screen with visible boundaries in which information is displayed. Windows can overlap on the screen, giving the appearance of one window being on top of another.

World Wide Web. (WWW) (W3) (the Web) An Internet client-server distributed information and retrieval system based upon HTTP that transfers hypertext documents across a varied array of computer systems. The Web was created by the CERN High-Energy Physics Laboratories in Geneva, Switzerland in 1991. CERN boosted the Web into international prominence on the Internet.

List of Abbreviations

ACB	Application Control Block
ACEE	Access Control Environment Element
AIX	Advanced Interactive executive (IBM's flavor of UNIX)
APA	All Points Addressable
API	Application Program Interface
APPC	Advanced Program-to-Program Communication
APPC/MVS	Advanced Program-to-Program Communication/Multiple Virtual Storage
APPLID	Application ID
APPN	VTAM Advanced Peer-to-Peer Network
ASCII	American National Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
AWE	Asynchronous Work Element
AWT	Abstract Windowing Toolkit (Java)
BIN	BINary
BMP	Batch Message Program
BPE	Base Primitive Environment
APF	Authorized Program Facility
CD-ROM	(optically read) Compact Disk - Read Only Memory
CEC	Central Electronic Complex
CFRM	Coupling Facility Resource Management
CGI	Common Gateway Interface (programs that provide services on the WWW)
CICS	Customer Information Control System (IBM)
CIMS	RACF security class used for IMS Commands
COBOL	Common Business Oriented Language
CPI	Common Programming Interface
CPIC	Common Programming Interface for Communications
CPP	C language PreProcessor
CSM	Complete Status Message
CTC	Channel to Channel
DASD	Direct Access Storage Device
DB	DataBase
DBCTL	Data Base ControL Subsystem
DBD	DataBase Description
DCE	Distributed Computing
DD	Dataset Definition
DLI	Data Language Interface
DLL	Dynamic Link Library
DRU	Destination Resolution Exit
EAB	Enterprise Access Builder
EBCDIC	Extended Binary Coded Decimal Interchange Code
EMH	Expedited Message Handling
EOM	End Of Message
ETO	Extended Terminal 0ption
FIFO	First In/First Out
FMH	Function Management Header
FTP	File Transfer Protocol
GIF	Graphic Interchange Format
GUI	Graphical User Interface
HOD	Host On Demand
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTP	Hypertext Transmission Protocol
HWS	Host Web Service
IBM	International Business Machines Corporation
IMS	Information Management System
IMS/ESA	Information Management System/Enterprise Systems Architecture
INTERNET	a worldwide network of TCP/IP-based networks
IO	Input/Output

IOPCB Input/Output Program Communication Block

IP Internet Protocol (ISO)

IRM IMS Request Message

ISC Inter-System Communications

ISC IBM Support Center

ISDN Integrated-Services Digital Network

ITOC IMS TCP/IP OTMA Connection

ITSO International Technical Support Organization

ISO International Organization for Standardization

ISPF Interactive System Productivity Facility (MVS & VM)

ITSO International Technical Support Organization

.JCL Job Control Language (MVS and VSE)

JDK Java Development Kit

JPEG Joint Photographic Experts Group (image format)

JITOC Java IMS TCP/IP OTMA Connection Connector

JRE Java Runtime Environment

JVM Java Virtual Machine

LPA Link Pack Area

LPAGE Logical PAGE

LPR Logical Partition

LTERM Logical TERMinal

LU Logical Unit

MFLD Message FieLD

MFS Message Format Service

MID Message Input Descriptor

MIME Multipurpose Internet Mail Extensions (RFC 1344)

MIT Massachusetts Institute of Technology

MOD Message Output Descriptor

MPP Message Processing Program

MQ Message and Queueing (IBM software)

MQI Message Queue Interface

MQM Message Queue Manager (IBM Messaging and Queueing)

MSC Multiple Systems Coupling

MVS Multiple Virtual Storage (IBM System 370 & 390)

MVS/ESA Multiple Virtual Storage/Enterprise Systems Architecture (IBM)

NACK Not ACKnowledged

NCP Network Control Program

NETID Network ID

NT Microsoft Windows NT

NTFS NT File System (Microsoft Windows NT)

NULL Empty, of no value

OLTP OnLine Transaction Processing

OS/2 Operating System/2

OSAM Overflow Sequential Access Method

OTMA Open Transaction Manager Access (from IMS)

PC Personal Computer

PCB Program Communication Block

PCX PiCture eXchange Files

PDS Partitioned Data Set

PIN Personal Identification Number

PING Packet INternet Groper

POP Post Office Protocol

PPP Point-to-Point Protocol

PPT Program Properties Table

PROC PROCedure

PROCLIB PROCedure LIBrary (IBM System/360)

PTF Program Temporary Fix

RACF Resource Access Control Facility

REXX Restructured Extended eXecutor Language

RPC Remote Procedure Call

RSM Request Status Message

SMTP Simple Mail Transfer Protocol

SNA Systems Network Architecture

SQL	Structured Query Language
STSN	Set and Test Sequence Numbers
SYSPLEX	SYStems comPLEX
TCB	Task Control Block (MVS control block)
TCP	Transmission Control Protocol (USA, DoD)
TCPIP	Transmission Control Protocol / Internet Protocol
TELNET	U.S. Dept. of Defense's virtual Terminal Protocol, based on TCP/IP
TIF	Tagged Image Format
TIMS	RACF security class used for IMS transactions
TM	Transaction Manager
TP	Transaction Program/process (OSI)
TRM	Transaction Request Message
TXT	Text
UACC	Universal ACCess authority
UNIX	An operating system developed at Bell Laboratories (trademark of UNIX System Laboratories, licensed exclusively by X/Open Company, Ltd.)
UOW	Unit Of Work
URL	Uniform Resource Locator
USERID	USER IDentification
VGR	VTAM Generic Resources
VNET	Virtual NETwork
VT	Virtual Terminal (OSI)
VTAM	Virtual Telecommunications Access Method (IBM) (runs
WAN	Wide Area Network
WLM	Work Load Manager
WWW	World Wide Web (Internet)
XCF	Cross-system Coupling Facility (MVS)
XRF	eXtended Recovery Facility

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