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What's New in VTAM:
VGR and Persistent Sessions

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Abstract

⚠ **This session describes the IMS implementations of both VTAM Generic Resources and VTAM Persistent Sessions. VGR provides a single system image for multiple IMSs and therefore simplifies the information an end user needs to logon or re-logon (after a failure) to one of several like instances of IMS. On the other hand, VTAM persistent session support provides the ability for end-user sessions to be maintained across a failure (e.g., IMS) and to be automatically reconnected when IMS is restarted. This session describes the functionality of both these VTAM capabilities in IMS and compares the use of one versus the other.**

VGR and RNR

⚠ **VTAM Generic Resources (VGR)**

- Function introduced in IMS V6

- Allows a user to logon with a generic name for IMS
  - ► VTAM connects the user to an available IMS in the generic group

- *Takes effect when initially establishing a session*

- Takes advantage of Parallel Sysplex capabilities

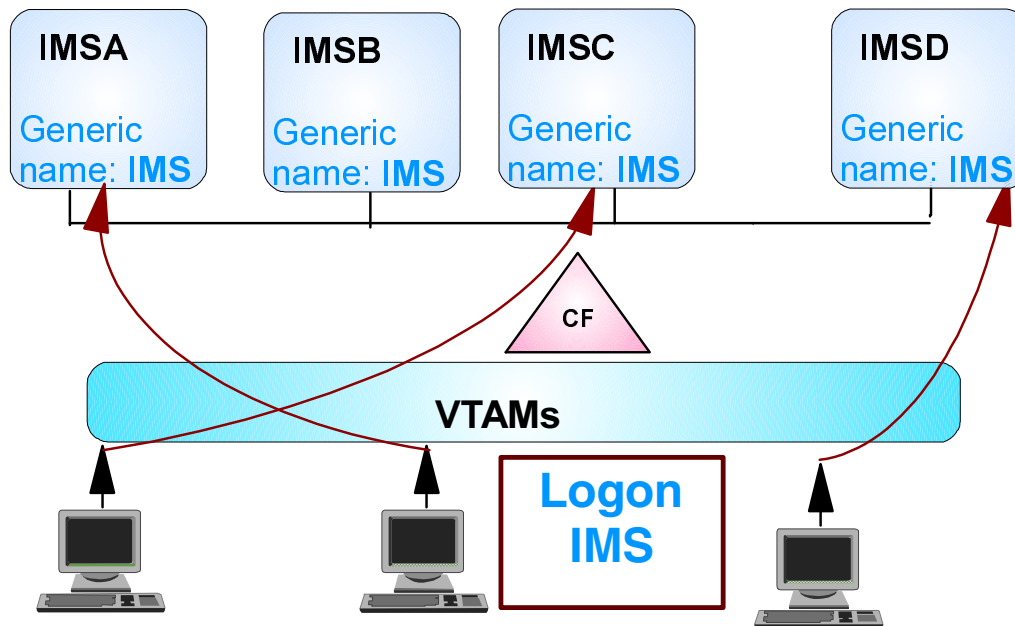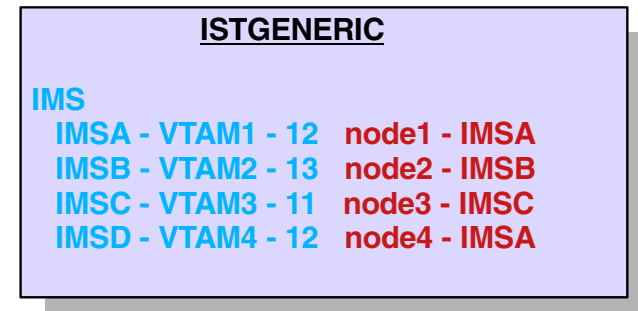⚠ **Rapid Network Reconnect (RNR)**

- Function introduced in IMS V7

- Keeps an end-user in session with IMS even during a failure (persistence)
  - ► VTAM automatically reconnects the end user to IMS when IMS is restarted

- *Takes effect once a session has been established*

- Supports single MVS environments as well as Parallel Sysplex

VTAM Generic Resources

VTAM Generic Resources (VGR)

⚑ **All IMSs in the sysplex join a VTAM generic resource group**

- ■ The IMSs specify the same generic resource name

- ■ Information is kept in CF structure ┈┈┈┈┈┈▶

ISTGENERIC		
IMS		
IMSA - VTAM1 - 12	node1 - IMSA	
IMSB - VTAM2 - 13	node2 - IMSB	
IMSC - VTAM3 - 11	node3 - IMSC	
IMSD - VTAM4 - 12	node4 - IMSA	

IMSA

Generic name: **IMS**

IMSB

Generic name: **IMS**

IMSC

Generic name: **IMS**

IMSD

Generic name: **IMS**

CF

VTAMs

Logon IMS

★ **Requires VTAM V4R2 and Coupling Facility**

★ **Requires APPN within the Sysplex**

★ **Single system image for multiple IMSs**

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VGR

⚠ **/START DC**

- IMS joins the Generic Resource Group (GRSNAME=IMS)

⚠ **When the first IMS (IMSA) joins a generic resource group**

- VTAM creates the GRG (IMS)
  - ► Adds IMSA to the Member List in ISTGENERIC

⚠ **As new members (IMSB, ...) join the group**

- VTAM adds them to the list

```
              I S T G E N E R I C
IMS

  IMSA  -  VTAMA  -  0
  IMSB  -  VTAMB  -  0
  ....
```

VGR ...

⚠ **Users can log on either using a generic or specific name**

- User (node3) logs on with *generic* name **(LOGON IMS)**
  - ► VTAM connects node3 to any available member
    - ● Updates *affinity table* (ISTGENERIC) to indicate node3 affinity for the selected member (IMSD)

- User (node4) logs on with *specific* APPLID **(LOGON IMSA)**
  - ► VTAM connects user to specific IMS (IMSA)

ISTGENERIC	
IMS	
IMSA - 550	node1 - IMSA
IMSB - 549	node2 - IMSB
IMSC - 552	
IMSD - 0	

ISTGENERIC	
IMS	
IMSA - 551	node1 - IMSA
IMSB - 549	node2 - IMSB
IMSC - 552	node3 - IMSD
IMSD - 1	node4 - IMSA

**Note: VGR does not apply to MSC connections**

VGR Affinities

⚠ **Affinity: A mapping of a node to a specific member (IMS)**

- Affinity is set when a session is first established

- Associates an LU to a specific IMS

- VTAM maintains the affinity table in its CF structure

⚠ **When an LU requests a session using the generic name**

- VTAM checks to see if an affinity exists
  - ▶ If one exists, the session request is routed to that member
  - ▶ Otherwise, VTAM chooses any of the members

⚠ **Affinity deletion is required to allow a user to logon to another IMS**

```
                    ISTGENERIC
Member    IMS
 List       IMSA - 551        node1 - IMSA       Affinity
            IMSB - 549        node2 - IMSB        Table
            IMSC - 552        node3 - IMSD
            IMSD - 1          node4 - IMSA
```
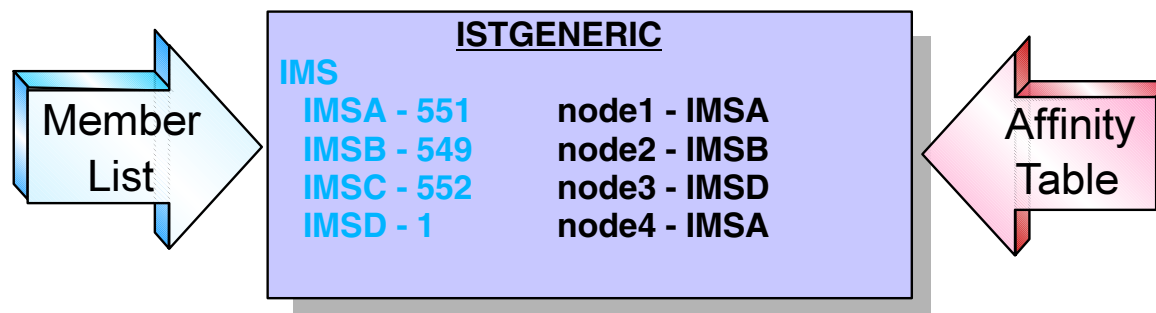
VGR - IMS Options

⚠ **IMS DFSDCxxx options: GRAFFIN and GRESTAE**

- Delivered via APAR PQ18590 in IMS/ESA V6 ✸

- Greater control over access availability to any IMS when failures occur

- **GRAFFIN = <u>IMS</u> | VTAM**
  - ▶ System option that specifies which component is to manage the Generic Resource affinities

- **GRESTAE = <u>Y</u> | N**
  - ▶ System option that defines whether or not IMS should reset affinities (CLSDSTs) during ESTAE processing
  - ▶ Applies to GRAFFIN=IMS only

✸GRAFFIN=IMS with GRESTAE=Y causes IMS to operate as it did without the APAR

> VGR support for APPC is provided by APPC/MVS
> - Specified on LUADD statement

GRAFFIN=IMS

⚠ **Affinity deletion [may occur](#) at session termination**

- ▪ Special treatment for ISC, SLUP/Finance, ETO

- ▪ Special treatment for LUs that have a VGR-related status
    - ► Conversation mode, full function response mode, FP response mode, exclusive mode, test or test MFS mode, preset destination mode
        - ● Existing status can prevent deleting the affinity
    - ► User-written exits (DFSSGFX0 and DFSLGFX0) can reset status

⚠ **Affinities are not (cannot be) deleted for MVS/CEC/VTAM failures**

- ▪ IMS ESTAE not driven and affinities still exist when IMS is restarted

⚠ **If affinity is not deleted at session termination**

- ▪ Next logon to generic name establishes session with existing affinity
- ▪ Must wait for an IMS restart

GRAFFIN = IMS...

Terminal Type	Exceptions	Affinity deleted at	If
Static terminals	SLUP/Finance/ISC	session termination ------------------------- never	★ no significant status ------------------------- status exists
ETO terminals	SLUP/Finance/ISC	session termination	--
ISC sessions	--	last parallel session ------------------------- never	cold termination ------------------------- if no cold term
SLUP/Finance (Static and ETO)	/CHA NODE xxx COLDSESS	never	--
" " "	--	/CHA NODE xxx COLDSESS	out of session and idle
ALL	--	IMS shutdown	IMS shutdown with LEAVEGR
ALL	--	IMS restart	Cold start or COLDCOMM

★ User signoff (DFSSGFX0)/ logoff (DFSLGFX0) exits can reset significant status

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GRAFFIN=VTAM

⚠ **Generally recommended for availability**

- Allows terminal sessions to be reestablished with other IMSs
  - ▸ ISC affinities continue to be managed by IMS regardless of GRAFFIN

⚠ **Non-ISC affinities are reset at failure:**

- CEC, MVS, IMS/ESA, VTAM, and Network/Session terminations

- Sessions can be reestablished immediately with any surviving IMS
  - ▸ VGR-related status conditions within failed IMS are automatically reset when it is restarted

GRAFFIN = VTAM

Terminal Type	Exceptions	Affinity deleted at
IMS terminals	ISC	session termination
ISC	--	IMS decision - affinity not managed by VTAM

⚠ **Considerations:**

- All FINANCE/SLUP sessions are cold started by IMS
  - Sequence numbers are reset to zero

- Automatic resetting of IMS status for all non-ISC sessions
  - Signoff/Logoff
  - First Signon/Logon after IMS failure/restart

IMS Status Settings

⚠ **Maintained in control blocks of local IMS**

- Not known to other IMS's in GRG

- Has no significance to VTAM

⚠ **Significant status:**

  - ► Conversation mode
  - ► Full function response mode
  - ► Fast Path response mode (new)
  - ► Exclusive mode
  - ► Test or MFS mode
  - ► Preset mode

VGR-Related IMS Status

⚠ **GRAFFIN=IMS (includes ISC regardless of GRAFFIN)**

- Status is not automatically reset by IMS

    - Existing status can prevent deleting the affinity

    - Can be reset by Signoff Exit (DFSSGFX0) for ETO and by Logoff Exit (DFSLGFX0) for static terminals

        - Provided for VGR, not restricted to VGR being active
        - Equivalent capability not provided in logon/signon exits or via IMS ESTAE process

VGR-Related IMS Status...

⚠ **GRAFFIN=VTAM**

- Status is automatically reset by IMS:

    - For ETO: at signoff, prior to calling DFSSGFX0 exit
    - For Static: at logoff, prior to calling DFSLGFX0 exit
    - Or, if not reset at signoff/logoff due to failures (IMS, MVS, CEC): at logon/signon after restart

GRESTAE

⚠ Background

- IMS ESTAE uses (synchronous) CLSDSTs to release VGR affinity where appropriate
  - ▶ Potential slowdown of IMS abnormal termination
  - ▶ VTAM I/O timeouts in cross domain environment when session outage notifications lost, i.e. no response to UNBIND

⚠ DFSDCxxx option: GRESTAE= Y | N

- Applicable only when GRAFFIN=IMS

- GRESTAE=Y continues CLSDSTs for affinity deletion during IMS ESTAE

- GRESTAE=N bypasses CLSDSTs during IMS ESTAE

⚠ Consideration
- ▶ Possible slow IMS termination -vs- continued terminal affinity to failed IMS

Rapid Network Reconnect

Rapid Network Reconnect (RNR)

⚠ **RNR implements VTAM persistent session support**

⚠ **Higher availability and reduced overhead**

- Quickly reestablishes VTAM sessions following system outages (IMS, MVS, CEC or VTAM)

- Eliminates session cleanup/restart following an outage

Background - VTAM Persistent Sessions

△ **VTAM Single Node Persistent Session (SNPS)**

- Reconnect must be on same CEC as original IMS

- Supports only application (IMS) failure/reconnect

△ **VTAM Multinode Persistent Session (MNPS)**

- Reconnect may be on another CEC in a sysplex

- Supports failures/reconnects, including IMS, VTAM, MVS, and CEC failures

△ **Persistent sessions apply to VTAM nodes except MSC**

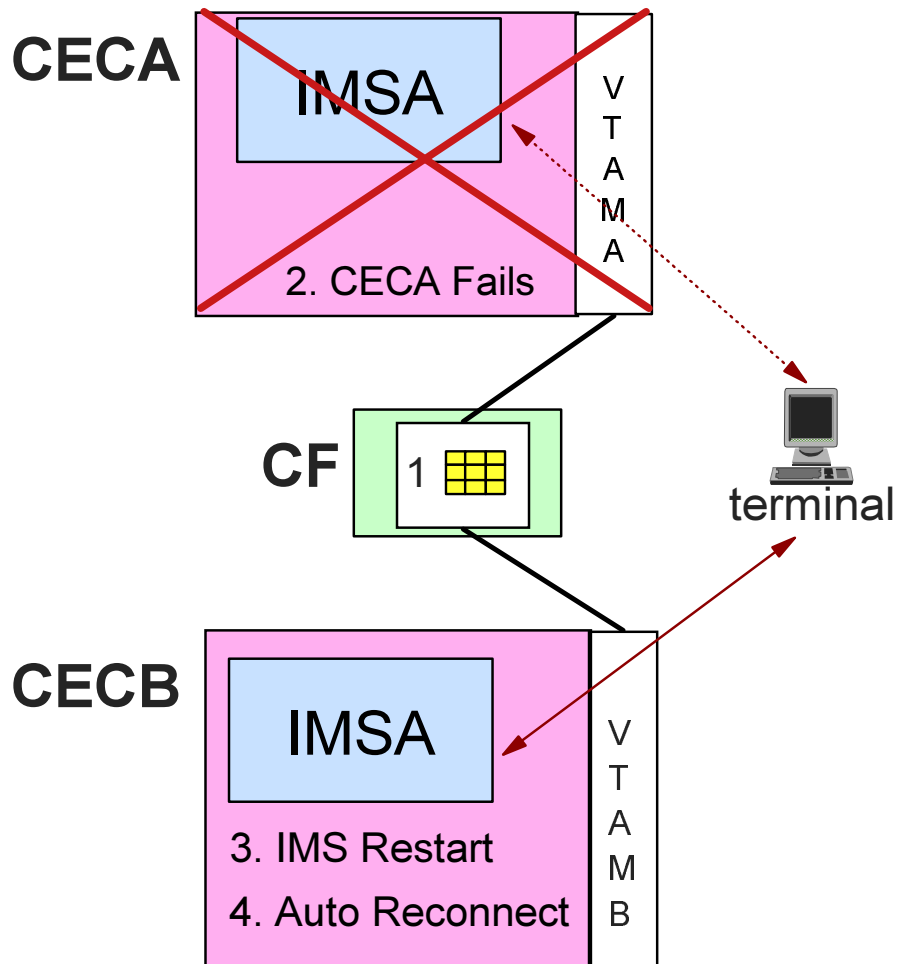- Persistent session support for APPC is provided by APPC/MVS

Single Node Persistent Sessions

⚴ **Single Node Persistent Session scenario**

1. VTAM stores session data in addr. space

2. IMSA fails - the session to terminal is pending recovery

3. IMSA restarts

4. Auto reconnect of terminal to restarted IMS
   - **Terminal is logged on**

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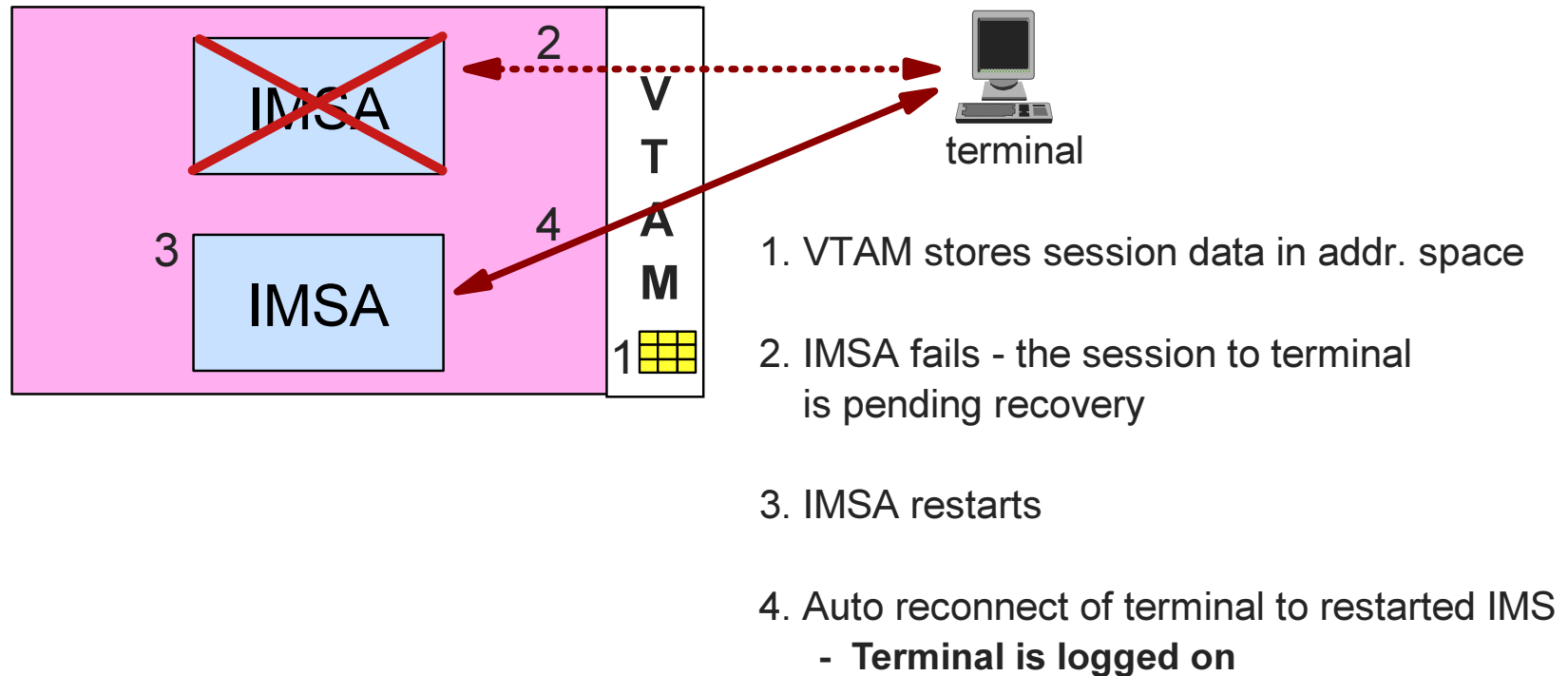
Multinode Persistent Sessions

⚠ **Multinode Persistent Session scenario**

CECA

IMSA

2. CECA Fails

V T A M A

CF 1 ▦

terminal

CECB

IMSA

3. IMS Restart

4. Auto Reconnect

V T A M B

1. VTAM stores session data in the CF

2. CECA fails
   - Another VTAM in the Parallel sysplex
     detects the error

3. IMSA is restarted on CECB

4. The sessions are restarted using
   information saved in the CF structure
   - **Terminal logged on**

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Signon Requirements

⚠ **Signon required after reconnect for:**

- SLU1 - non-printer only
- SLU2
- Non-SNA 3270
- NTO

⚠ **Signon automatically reestablished for:**

- SLU0 - FINANCE/3600, SLUP
- LU6.1 - ISC
- SLU1 - printer only

RNR Actions

⚠ **At session establishment**

- ■ Session information stored by VTAM in address space or CF

⚠ **At IMS failure**

- ■ Nodes cannot logon to another IMS
  - ▸ Terminal users appear to be "hung"
    - ● Timer may be specified terminate sessions and release terminals

⚠ **/START DC following IMS restart initiates RNR action**

- ■ Sessions reestablished
  - ▸ Logon not required
  - ▸ Signon may be required

Persistent session support for APPC is provided by APPC/MVS
- ● Specified on LUADD statement
- ● Sessions are persistent, conversations are not

VGR and RNR

In Summary - VGR

⚠ VGR

- Answers the need for
  - ▸ Load balancing, application availability, capacity growth

- Allows end users to immediately reconnect to another IMS after a failure

- Assumes any IMS in the Generic Resource Group can accept or process any transaction
  - ▸ Data Sharing
  - ▸ Shared Queues
  - ▸ MSC and workload routing

- Requires a parallel sysplex environment

⚠ Considerations

- Load balancing is performed only during session establishment
  - ▸ Work is routed to newly started systems as new logons are received

- Ability to reconnect to another IMS after a failure is based on affinities
  - ▸ GRAFFIN = IMS may maintain affinities
  - ▸ GRAFFIN = VTAM releases affinities and resets status
    - ● E.g., conversation mode, response mode, etc.

VGR
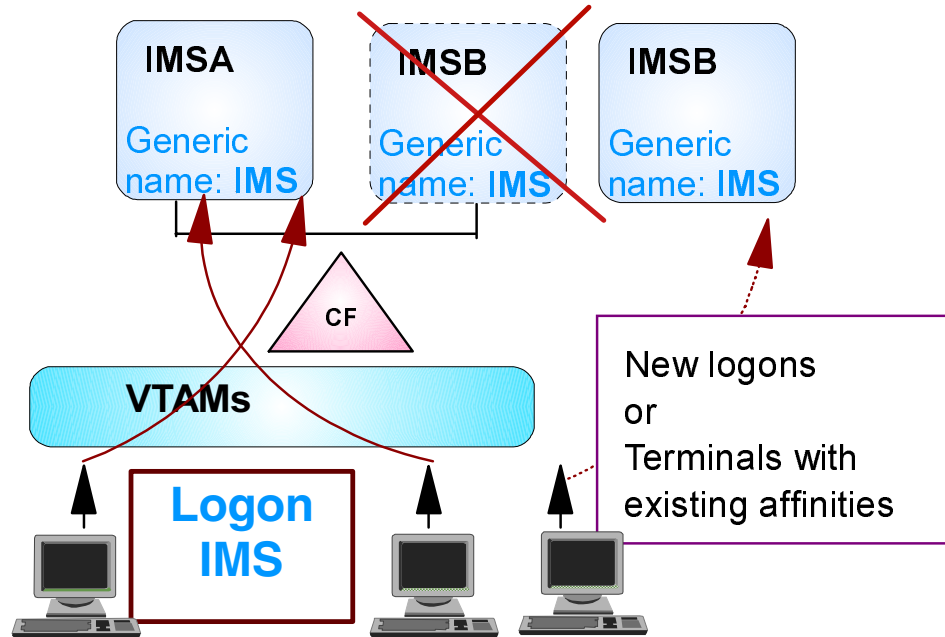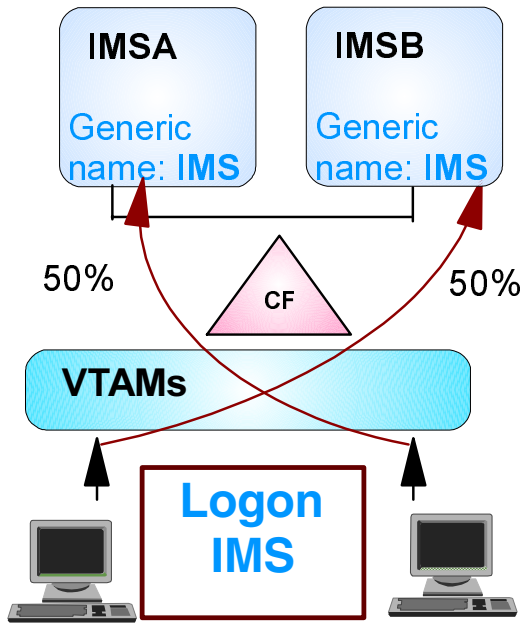
During ERE process for IMSB, all logon requests
are routed to IMSA unless a terminal has an affinity with IMSB

In Summary - RNR

⚠ **RNR**

- Eliminates session termination and establishment traffic during a failure
    - ► Session information is maintained
    - ► Is most useful when there is a need to reconnect and continue processing on the same IMS

- Reestablishes terminal service to **same IMS** more quickly
    - ► Maintains status conditions
        - ● E.g., conversation mode

- Can be used in a single system image or parallel syplex environment

⚠ **Consideration**

- Value of RNR depends on how quickly IMS is restarted

VGR With RNR

⚠ **When establishing new sessions**

- VGR provides session load balancing

- Once an IMS is chosen, RNR establishes persistence

⚠ **IF IMS fails**

- IF RNR is NOT enabled
  - ► But VGR is active
    - Remote user can issue a logon request
    - The appropriate level of affinity and terminal status management is performed based on GRAFFIN

- IF RNR is active and automatic reconnect is specified
  - ► During /STA DC after a failure, session reconnect is scheduled
  - ► Remote user waits for reconnect of existing session
    - VGR is not invoked to establish a new session with another IMS

⚠ **If IMS is cold started (or COLDCOMM)**

- All active terminal sessions are terminated (including persistent sessions)

- If VGR is active, all affinities and statuses are deleted

VGR with RNR

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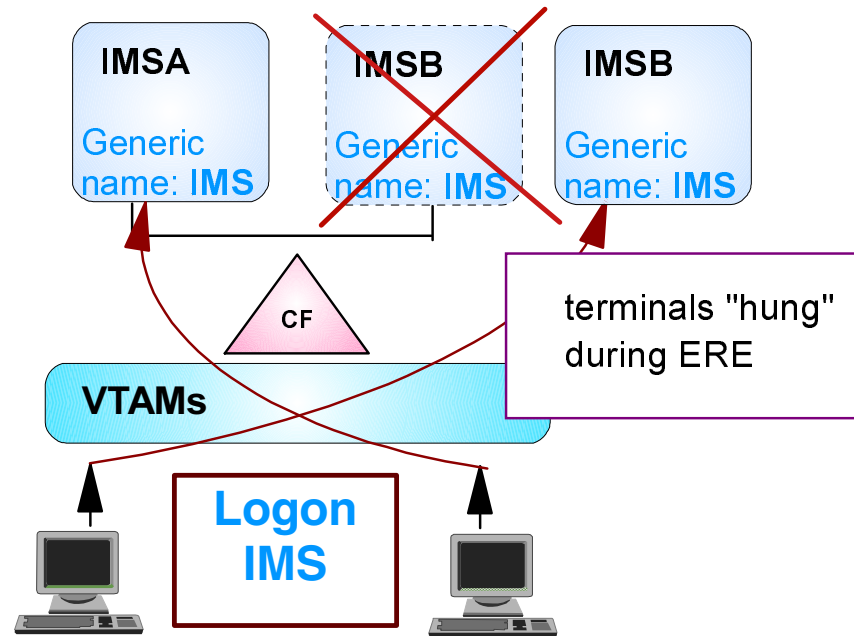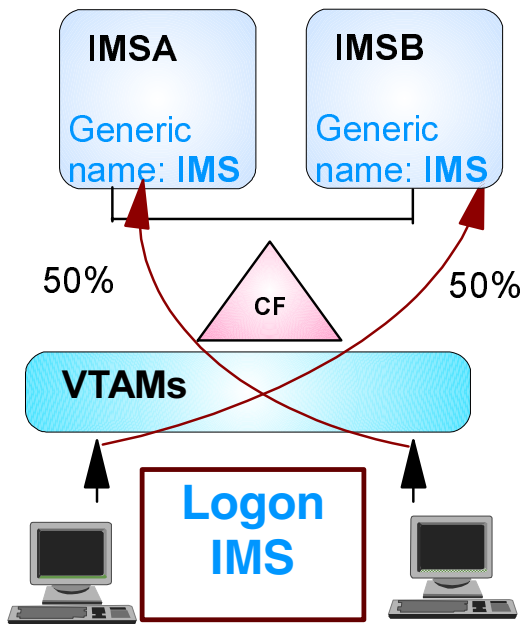
In Summary

⚙ VGR

- Provides load balancing across IMSs

- Supports the use of a generic name when logging on to multiple IMSs

- Allows end users to quickly reconnect to another IMS in the case of a failure

⚙ RNR

- Keeps sessions persistent even during a failure

- Applicable when users need to log back on to same IMS after a restart

- Reduces network overhead