MicroVAX Dual-Host Systems

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Digital Equipment Corporation
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Preface

This manual describes the basic MicroVAX dual-host configurations supported by VAX/VMS version 5.3-2.

For information on how to install or operate your dual-host system, see the *Operation* or *Installation* manual for the appropriate MicroVAX system.

Intended Audience

This manual is intended for use by Digital customers who are familiar with the individual MicroVAX systems that combine into dual-host configurations. The content of this manual is primarily reference information needed to plan configurations of dual-host systems.

Organization

This manual has two chapters, as follow:

Chapter 1 presents an overview of dual hosting and the basic requirements for dual-host configurations.

Chapter 2 gives examples of supported configurations, with diagrams.

Conventions

The following conventions are used in this manual:

Convention	Meaning
NOTE	Provides general information about the current topic.
CAUTION	Provides information to prevent damage to equipment or software.
WARNING	Provides information to prevent personal injury.

Chapter 1
Dual-Host Systems and DSSI

1.1 Introduction to Dual-Host Systems

A dual-host configuration is made up of two Q-bus MicroVAX systems connected by a Digital Storage Systems Interconnect (DSSI) bus. The two systems share one another's Integrated Storage Elements (ISEs) across this bus. The ISEs can be located within each host, within an expander, or both.

In a dual-host configuration, both systems remain functionally independent. However, the common DSSI storage bus, together with VAXcluster software, creates a unique subsystem that makes all media devices available to both host systems. This provides two data paths for access to all ISEs by either host.

A dual-host system always includes RF-series ISEs, Ethernet, a DSSI storage bus, the VMS operating system, and DECnet and VAXcluster software. A MicroVAX system can also function as dual host with a VAX 4000 series system.

1.1.1 Higher Disk Availability

Dual-host systems provide higher disk availability for critical applications. A dual-host system can provide automatic failover when used as a server for satellites in a VAXcluster system. In this instance, the application runs on the satellite. As such, the dual-host system increases your ability to access data by providing alternate an access path to the running application if one of the host systems fails. The user sees a pause in the application. Then, following the cluster state transition, the application resumes on the other host with no user intervention.

When an application is running on one of the dual hosts, and that host system fails, the user has to restart the application on the second host system.

1.1.2 Minimized Downtime

In a timesharing environment, a dual-host system minimizes downtime. If one host fails, a user on that host simply logs in to the second host and restarts the job, or does an edit/recover routine. The second host in the configuration assumes responsibility for the application and lets the user access data on the storage devices connected to the DSSI storage bus. (The same recovery/restart routine is used in CI VAXclusters.)

Using a dual-host system for a boot server can help eliminate the risk of cluster downtime if a single host cannot be booted. Dual hosts create two paths to disk storage, ensuring that the VAXcluster users have automatic failover to another system if one of the boot servers fails. A dual-host configuration provides high system and data availability, and maintains the VAXcluster.

Other advantages of a dual-host configuration include the following:

* Automatic failover when an application is running on the satellite node

* Higher availability to data for satellites and timesharing users

* Read/write file sharing down to the record level

* Resource sharing through distributed batch and print queues

* Data and resource sharing through a distributed file system

* Centralized system management and security

* Ability to run any VMS application

* Growth path from a single VAX 4000 or MicroVAX system

* Greater performance and more I/O than with a single-host system

1.2 Dual-Host Components

Basic dual-host components are the RF-series ISEs, the storage expander, and the DSSI cable.

1.2.1 RF-Series Integrated Storage Elements

RF-series ISEs are:

    RF30 (150 Mbytes)
    RF31 (380 Mbytes)
    RF71 (400 Mbytes)

The ISE has a disk controller on board the physical drive. The ISE receives a complete packet of information requesting a task to be done. The intelligent on-board controller interprets the packet and performs the task without any further communication from other DSSI nodes. At this point, the ISE begins doing the intelligent tasks of reading, writing, collecting status, and so forth.

The intelligence of the ISE extends beyond reading and writing. The intelligent on-board controller can provide detailed status of the ISE, or start and monitor an internal diagnostic of the ISE.

1.2.2 Supported Expanders

Dual-host systems can be expanded by means of separate enclosures that contain ISEs. The B213F, R215F, and R400X enclosures expand the DSSI bus with additional ISEs, with the following specifications for use in a dual-host configuration:

- One expander per DSSI bus

- Can be used with systems not based on DSSI by adding KFQSA

1.2.3 External DSSI Cables

One external DSSI cable is required for each connection between systems; two cables are required to connect two systems and an expander.

External cables connect DSSI storage devices and adapters. The DSSI external cable, part number BC21M–09, is included with a factory-configured dual-host configuration, as well as with expansion boxes. If your system was not factory-configured, you must order additional cables separately.

1.3 DSSI Storage Bus and Adapters

Each DSSI storage bus consists of a maximum of eight nodes, two of which may be adapters and six of which may be ISEs.

Embedded DSSI adapters (EDAs) are the interface between a CPU host and the DSSI storage bus, connecting the CPU and the intelligent controllers within each ISE. Once the initialization and device configurations are complete, the DSSI adapter becomes a passive protocol interpreter, leaving the communications control to the host CPU and the intelligent controller on each ISE.

Two basic DSSI adapter designs are in use for dual-host configurations: the EDA and the KFQSA.

1.3.1 Embedded DSSI Adapter

The primary adapter design involves DSSI interface logic embedded on the CPU module. This design is the called the Embedded DSSI Adapter (EDA).

An EDA may be exist along with a KFQSA module in the same host.

1.3.2 KFQSA

The KFQSA is a standard Q-bus option module that may be added to a MicroVAX system to increase the number of DSSI storage busses connected to that system. See Table 1-1 for an explanation of KFQSA suffixes. Each KFQSA module adds one additional DSSI storage bus to the system.

Table 1-1: KFQSA Suffixes

Suffix	Description	Where Needed
-SA	KFQSA Q-bus to DSSI adapter, factory installed in BA213 enclosure	For MicroVAX 3800 only; cannot be ordered separately
-SE	Second KFQSA Q-bus to DSSI adapter, factory installed in BA213/BA215 enclosure	When new MicroVAX 3300, 3400, or 3800 needs second DSSI adapter
-SG	KFQSA adapter, field installed in BA213/BA215 enclosure	For existing MicroVAX 3600 or 3900 that requires its first DSSI adapter, or for existing MicroVAX 3300, 3400, or 3800 that requires second DSSI adapter
-AA	KFQSA Q-bus to DSSI adapter, field installed in BA23 or H9642 enclosure	For existing MicroVAX II in BA23 or H9642 cabinet that requires DSSI adapter
-BA	KFQSA Q-bus to DSSI adapter, field installed into BA123 enclosure	For existing MicroVAX II in BA123 enclosure that requires DSSI adapter

1.3.3 Embedded DSSI Adapter (EDA)

The other adapter design involves DSSI interface logic embedded on the CPU module. This design strategy is called the Embedded DSSI Adapter (EDA). Currently the MicroVAX EDA is found on the KA640 CPU module (MicroVAX 3300/3400).

An EDA may be installed along with a KFQSA module in the same host.

1.4 Configuration Rules for Dual-Host Systems

The following elements are required when planning dual-host configurations.

1. Two Q-bus MicroVAX systems, or one Q-bus MicroVAX and one VAX 4000.

2. Software licenses shown in Table 1–2.

3. DSSI adapters (KFQSA module and/or embedded adapters). See Table 1–3 and Table 1–4.

4. Ethernet hardware.

5. Maximum of six RF-series ISEs between DSSI adapters.

6. Maximum of four enclosures (two systems, two expanders) per DSSI storage bus.

Table 1–2: System Software Licenses

First System	Second System
VMS	VMS
VAXcluster	VAXcluster
DECnet full-function	DECnet end-node

Table 1–3: MicroVAX Systems With Internal DSSI Adapter

System	Adapter Type
MicroVAX 3300	Embedded on CPU (EDA)
MicroVAX 3400	Embedded on CPU (EDA)
MicroVAX 3800	KFQSA module

Table 1–4: MicroVAX Systems Without Internal DSSI Adapter

System	Adapter Requirements
MicroVAX II	KFQSA–AA or KFQSA–BA
MicroVAX 3500	KFQSA–SG
MicroVAX 3600	KFQSA–SG
MicroVAX 3900	KFQSA–SG

Chapter 2 shows different ways to use MicroVAX systems in dual-host configurations. As you see in Chapter 2, previously purchased Q-bus MicroVAX systems can be upgraded to dual-host configurations.

1.5 VMS and Dual-Host Configurations

Table 1–5 shows the VMS versions required to use adapters in the various dual-host configurations.

Table 1–5: VMS Versions, Adapters, and Restrictions

VMS Version	Adapter Module	Adapter Restrictions
5.0–2A	EDA-to-EDA	EDA640 only
5.1	EDA640-to-EDA640	No EDA with KFQSA Single adapter/system
5.1–1	KFQSA-to-KFQSA	No EDA with KFQSA Single adapter/system
5.3	Either or both	Mixed adapters allowed Dual DSSI/dual host allowed

Software requirements also include DECnet and VAXcluster software.

1.6 Module Order

The order of modules for individual systems in a dual-host configuration is the same as for single-host configurations. In the case of two KFQSAs in the same configuration, KFQSA modules are installed at the end of the respective backplane.

1.7 System Disk

A dual-host configuration may be run using one system disk. Since fewer failures are seen in expanders than in systems, it is recommended that, when possible, the system disk be located in an expander.

Chapter 2
Supported MicroVAX Dual-Host Configurations

This chapter contains diagrams illustrating nine supported MicroVAX dual-host configurations.

- Figure 2–1: MicroVAX hosts, each using a KFQSA adapter

- Figure 2–2: MicroVAX hosts, each using an EDA adapter

- Figure 2–3: MicroVAX hosts using mixed adapters

- Figure 2–4: MicroVAX hosts with EDAs and a shared expander

- Figure 2–5: Two Q-bus MicroVAX systems with KFQSA adapters and shared expander

- Figure 2–6: Two Q-bus MicroVAX systems with a shared expander and mixed adapters

- Figure 2–7: Two non-DSSI MicroVAX systems with two DSSI expanders

- Figure 2–8: Two Q-bus MicroVAX systems in a dual DSSI/dual-host configuration

- Figure 2–9: MicroVAX and VAX 4000 systems as dual hosts with shared expander
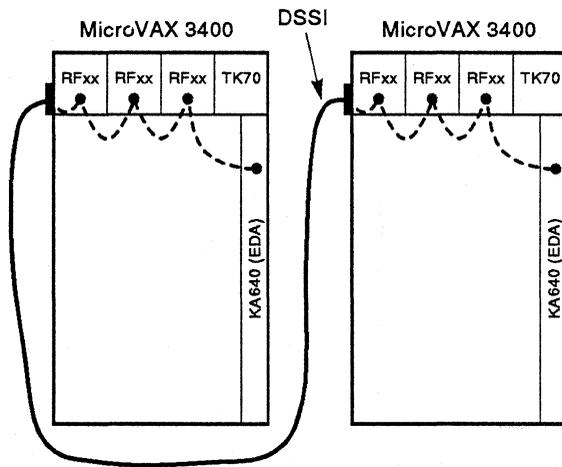
Figure 2–1: Two Q-Bus MicroVAX Systems, Each Using a KFQSA Adapter
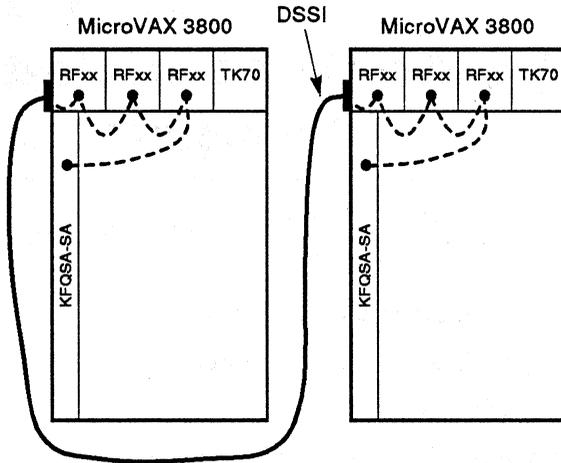
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In Figure 2–1, ISEs are located in the system enclosures. You can create this configuration with any combination of MicroVAX 3300, 3400, and 3800 systems, all of which include internal DSSI storage.
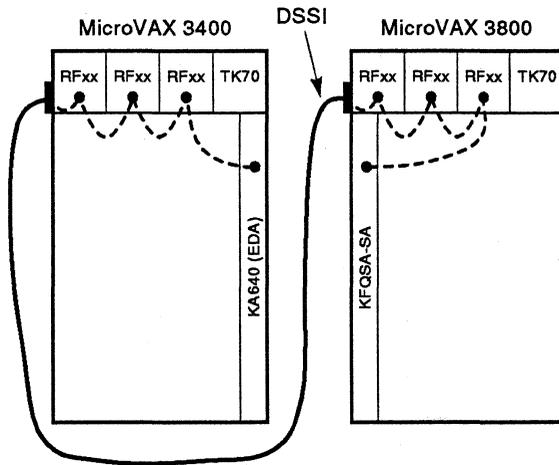
Figure 2–2: Two Q-Bus MicroVAX Systems, Each Using an EDA Adapter

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The configuration in Figure 2–2 can be created with any combination of MicroVAX 3300 or 3400 systems, which include internal DSSI storage.

**Figure 2–3: Two Q-Bus MicroVAX Systems Using Mixed Adapters**

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NOTE: *VMS V5.3 or later is required for all mixed-adapter configurations.*

The configuration in Figure 2–3 can be created with a MicroVAX 3300 or 3400 system combined with a MicroVAX 3800 system, all of which include internal DSSI storage.

Figure 2–4: Two Q-Bus MicroVAX Systems with EDAs and a Shared Expander
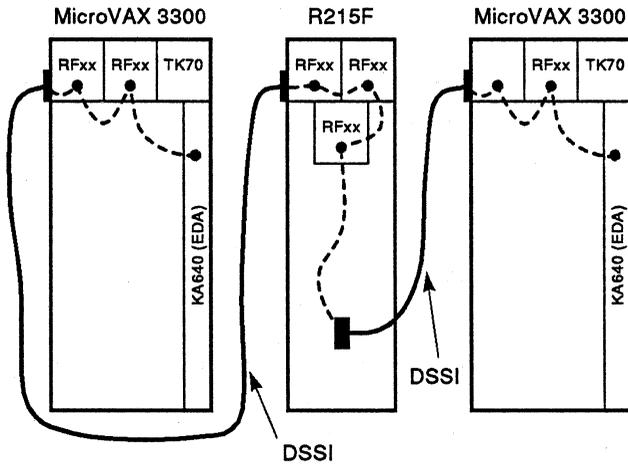
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In Figure 2–4, the two MicroVAX systems share an expander. This increases the level of availability for dual-host systems with internal DSSI devices by placing the system and critical data disks in the expander, which has a separate power supply. The ISEs in the expander are available to all users on both dual-host nodes if one of the MicroVAX systems is unavailable.

Figure 2–5: Two Q-Bus MicroVAX Systems with KFQSA Adapters and Shared Expander
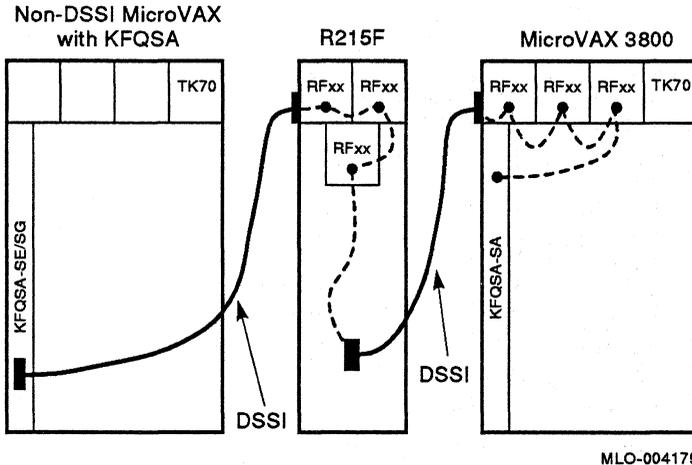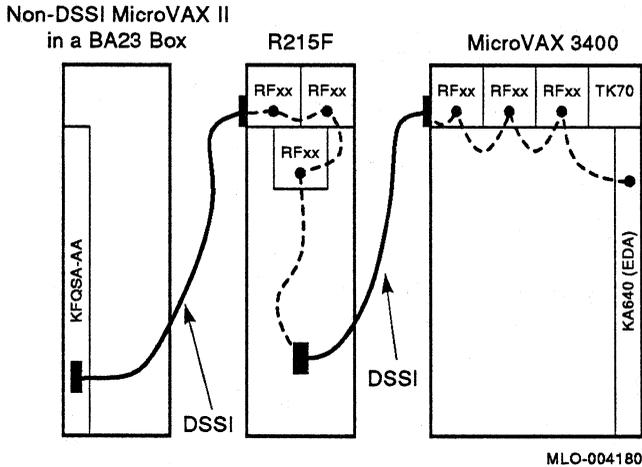

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Figure 2–5 shows a configuration that increases the level of availability for dual-host systems with internal DSSI devices by placing the system and critical data disks in the expander, which has a separate power supply. The ISEs in the expander can continue to operate if one of the MicroVAX systems is unavailable.

This configuration also provides a way to create a dual-host system using MicroVAX systems that do not have internal DSSI storage, including MicroVAX II, 3500, 3600, and 3900 systems. These systems can share DSSI storage when you add a KFQSA storage adapter and place the ISEs in an expander. Refer to Table 1–4 for applicable KFQSA order names.

Figure 2–6: Two Q-Bus MicroVAX Systems with a Shared Expander and Mixed Adapters

MLO-004180

NOTE: *VMS V5.3 or later is required for all mixed-adapter configurations.*

Figure 2–6 shows Q-bus MicroVAX systems, with mixed adapters, sharing the same expander.

This configuration increases the level of availability for dual-host systems with internal DSSI devices by placing the system and critical data disks in the expander, which has a separate power supply. The ISEs in the expander can continue to operate if one of the MicroVAX systems is unavailable.

This configuration also provides a way to create a dual-host system using MicroVAX systems that do not have internal DSSI storage, including MicroVAX II, 3500, 3600, and 3900 systems. These systems can share DSSI storage when you add a KFQSA storage adapter and place the ISEs in an expander. Refer to Table 1–4 for applicable KFQSA order names.

All internal disks (RD54, RA70, and/or RA90) remain local to the system in which they reside.

**Figure 2–7: Two Non-DSSI MicroVAX Systems with Two DSSI Expanders**
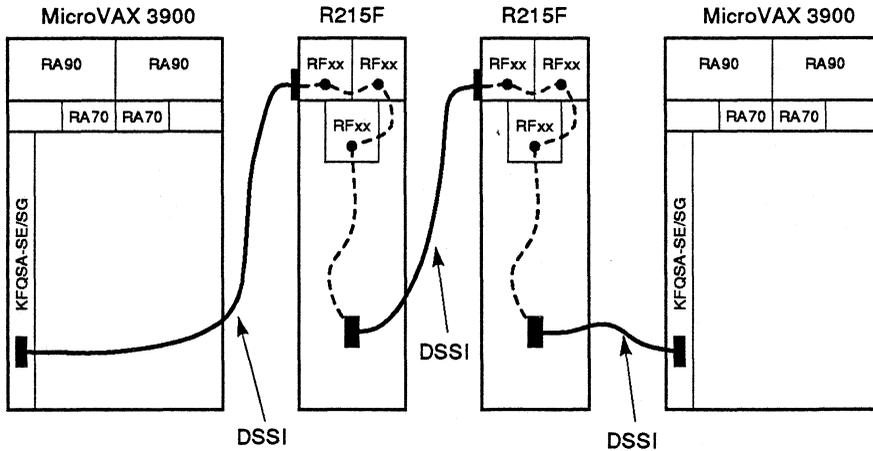
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Figure 2–7 shows a dual-host MicroVAX system that is sharing two expanders. With ISEs in the expanders, all ISEs are powered up and available even if one of the MicroVAX systems becomes unavailable.

Any mix of MicroVAX II, MicroVAX 3300/3400, 3500/3600, or 3800/3900 systems may be used.

All internal disks (RD54, RA70, and/or RA90) remain local to the system in which they reside.

## Figure 2–8: Two Q-Bus MicroVAX Systems in a Dual-DSSI, Dual-Host Configuration
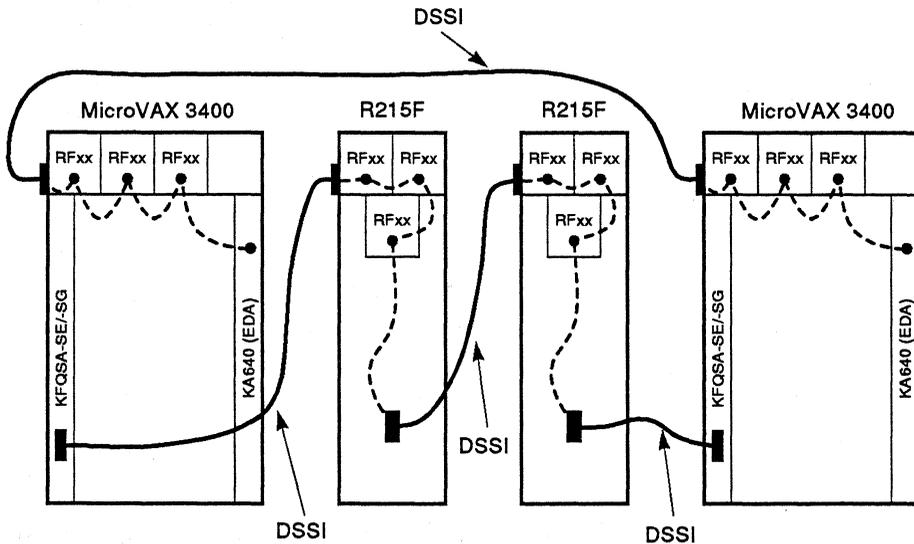
MLO-004182

NOTE: *VMS V5.3 or later is required for all mixed-adapter configurations.*

In Figure 2–8, the six ISEs within the host enclosures are shared on the internal (EDA) DSSI bus. The six ISEs in the expanders are shared on the KFQSA-based bus.

Figure 2–9: MicroVAX and VAX 4000 Model 300 as Systems Dual Hosts with Shared Expander
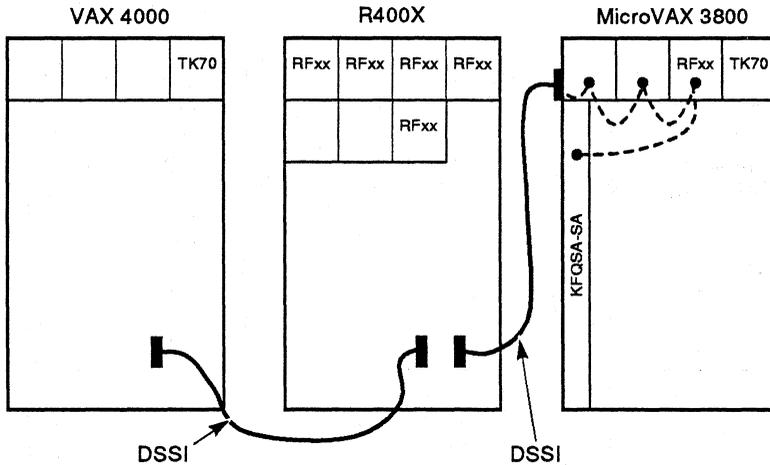
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In Figure 2–9, a DSSI-based MicroVAX shares a DSSI bus with a VAX 4000 Model 300 system. The MicroVAX host in this configuration, being factory-configured, contains one ISE.

Appendix A
Related Documentation

The following documents contain information related to the concepts and hardware maintenance of dual-host system configurations.

Document Title	Order Number
KFQSA Installation and User Guide	EK–KFQSA–IN
RF71 User Guide	EK–RF71E–UG

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