

Ingres[®] 2006

Getting Started

Updated March 15, 2006

INGRES[®]

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Chapter 1: Welcome!

Welcome to Ingres®, the complete open source information management solution! Ingres lets you develop and deploy robust, mission-critical applications in a variety of environments.

This guide provides the information you need to get started quickly and productively with Ingres.

Ingres Features

Ingres is a complete relational solution, providing the following features:

- A robust, high-performance relational database management system (RDBMS) on which you can build the best in mission-critical applications.
- Support for the latest technology, such as multiple processors and 64-bit architecture, and standards such as XML and Unicode. The extensive list of supported platforms includes Linux for zSeries and S/390, UNIX, and Windows.
- Easy to manage environment that requires far less maintenance than the competition. Ingres is hard to beat in the area of long-term cost of ownership.
- The Ingres Management Architecture (IMA) tools provide the framework that allows you to create system management applications using standard SQL tools and access multiple installations across Ingres Net.
- Ingres Web Deployment Option provides users with a secure and reliable foundation for Internet-based electronic commerce. Applications developed with Ingres Web Deployment Option can be used to provide full read/write access to enterprise-wide corporate data. Database-driven web sites provide much greater flexibility and can reflect changes in dynamic content as they happen.
- Open connectivity lets you integrate the entire enterprise—from PCs to mainframes. Ingres Net, coupled with the Ingres ODBC and JDBC drivers, let you take advantage of the technologies that drive the business environment.

Through ODBC, Ingres allows transparent access to enterprise data repositories. Applications developed through ODBC are independent of hardware, networking protocols, and operating systems. The Ingres ODBC driver uses the native API (application programming interface), effectively making ODBC a native language for Ingres.

If you prefer, you can use the OpenAPI to provide access to all distributed databases and take advantage of an alternative to embedded SQL.

- Integration of data from multiple sources on different platforms from a single application.

The Enterprise Access products provide a single, standard interface for both relational and pre-relational databases. Real-time access is provided for a variety of client applications running on Windows, OpenVMS, UNIX, and Linux workstations, as well as through web browsers. Popular application development tools can utilize this technology, meaning that your options are unlimited.

Databases supported include all popular UNIX or Microsoft Windows-based database management systems such as Oracle, Informix, Sybase, and Microsoft SQL Server. On the OS/390 platform, a separate product called EDBC gives the same level of access to Advantage CA-IDMS Database, Advantage Datacom Database, DB2, VSAM, CICS/VSAM, and IMS — so you can truly take your data from anywhere.

- Ingres Distribution Option supports distributed databases across a wide variety of hardware, software, and networking architectures. Regardless of whether the data resides on desktops or mainframes, Ingres Distributed Option lets you treat all your enterprise data as a single, global Ingres database.
- Ingres Replicator Option provides fault-tolerant data replication and guaranteed data integrity. Two-way replication allows your business to carry on when the network link is down. This process holds the data and completes the replication as soon as the network becomes available. Data is readily available to users at anytime or anywhere, and can be administered using the graphical user interface of Visual DBA.
- The Ingres character-based tools including Embedded SQL and Vision are available for more traditional environments. Embedded SQL programming kits are available for C, COBOL, Fortran, and several other 3GLs.
- Additional platform-specific, TP monitoring, and cluster support options, provide the integrity and reliability you need in a distributed environment by ensuring that transactions do not get lost or damaged.
- The Ingres Cluster Solution on Linux provides support for Linux Cluster environments. Ingres exploits open source and third party software to provide extensions to the base operating system. This software includes cluster file systems such as Oracle Cluster File System (OCFS) and the Red Hat Global File System (GFS), and the OpenDLM Distributed Lock Manager (DLM) based on the AIX DLM released by IBM to the open source community. Linux Cluster support lets you achieve scalability and reliability on a low-cost clustering platform.

Ingres Users

Ingres is designed for a wide variety of users, from application developers and database management experts, to users with little computer experience. Although an individual can fill more than one of the functions described here, Ingres users include four basic types:

- **System administrator**—The system administrator is responsible for general operations and for designating who can use Ingres. See your system administrator for information about obtaining access to Ingres.
- **Database administrator**—A database administrator is responsible for one or more Ingres databases. The database administrator creates and maintains the database, ensuring that the data is accurate and protected and that only approved users have access to the data. See your database administrator for specific information about your databases.
- **Application developer**—An application developer uses Ingres tools to create customized applications.
- **User**—A user (sometimes referred to as an end user) runs an Ingres or customized user application to examine or update data in an Ingres database.

The Ingres user interfaces include tools for all these types of users.

What You Need to Know to Use This Guide

This guide is intended for all Ingres users, including the system administrator, the database administrator, application developers, and users. Some chapters assume you are familiar with:

- Basic programming concepts
- Basic relational DBMS concepts

To follow the instructions in this guide, you must have a working knowledge of operating system management or be in close contact with the operating system administrator. You must also be familiar with the windowing system on the target platform of the installation, including terminology, navigational techniques, and how to work with standard items, such as menus and dialogs.

Note: Some procedures in this guide require operating system privileges (or permissions). If you do not have these privileges and the operating system expertise associated with them, have the operating system administrator perform these tasks.

Search the Ingres Guides

Ingres manuals are delivered in Portable Document Format (PDF) with cross-book search capability.

To access the Ingres guides

1. Open the Ingres Bookshelf PDF file in Acrobat Reader. To do this on Windows, right-click the Ingres system summary icon in the system tray, select Ingres Documentation, and then Ingres Bookshelf.

Acrobat Reader (if installed on your system) starts and the PDF file is opened. The bookshelf file contains links to all guides in the Ingres documentation set.

2. Click the name of a guide.

The PDF file of the selected guide is opened.

3. Click the Bookshelf bookmark, which is the first entry in the bookmark pane.

You are returned to the Bookshelf PDF file, from which you can select another guide.

To search the Ingres guides, open any Ingres PDF file in Acrobat Reader and use the Search function.

Chapter 2: Installing Ingres on Windows

This chapter describes pre-installation tasks for installing Ingres in Microsoft Windows environments and shows you how to install the product. It then describes post-installation tasks and procedures for starting up and shutting down Ingres.

System Requirements on Windows

Disk space and memory requirements are dependent on a number of factors such as number of users, size of the transaction log file, number and size of databases, and so on.

Note: The recommended hard disk space is the amount required for the full installation of Ingres—partial installations require less space. These requirements refer only to the Ingres development system and do not reflect the requirements for your Ingres compiled and linked programs, the files required to actually run the installation, or the documentation. The actual requirements for your application programs depend almost entirely on the architecture you build and the code standard you decide to use.

For an up-to-date list of supported operating systems, see the Ingres Technical Support web site, accessible from <http://ingres.com>.

The system requirements needed to install and run Ingres as a server are as follows:

Component	Minimum	Recommended
Operating system	Windows 2000, Windows XP, or Windows Server 2003	—
Hard disk space	120 MB	250–400 MB
RAM	128 MB	512 MB

The system requirements needed to install and run Ingres as a client are as follows:

Component	Minimum	Recommended
Operating system	Windows 2000, Windows XP, or Windows Server 2003	—
Hard disk space	20 MB	20 MB
RAM	32 MB	64 MB

How You Prepare for Installation on Windows

Before installing Ingres, you must perform the following tasks:

- Create the system administrator account
- Establish client/server connectivity required by Ingres Net

System Administrator Account

The system administrator account is a user account that is used for system management on each Ingres installation. The system administrator account owns the installation, and so the system administrator is often referred to as the installation owner.

This account must be created before installing the DBMS Server. You must install Ingres under this account because every DBMS system file requires ownership by this user.

Note: Use the system administrator account only for Ingres system management work. We recommend that you do not put non-Ingres files in this account.

Create the System Administrator Account on Windows

Ingres must be installed under an account owned by the system administrator (installation owner) so you must create this account before installing the product.

On Windows, the system administrator account can be created either on the local machine or, in the case of a domain, on the Primary/Secondary Domain Controller. Any user rights required for this account must be granted to the user (either locally or on the domain) on the local machine.

To create the user account for the Ingres system administrator locally

Note: The procedure shown here is done on Windows XP and uses "ingres" as the user name.

1. Right-click the My Computer icon on the desktop and choose Manage.

The Computer Management window appears.

2. Expand the Local Users and Groups branch under System Tools, right-click the Users branch and choose New User.

The New User dialog appears.

3. Type the name of the user in the User Name text box. Specify any other desired options, including a password. Clear the User Must Change Password at Next Logon check box. Click Create, and then Close.

The user name is defined.

4. Click the name of the new user in the right pane.

The Properties window appears.

5. Click the Member Of tab, and then click Add.

The Select Groups dialog appears.

6. Enter **Administrators** in the field "Enter object names to select," and then click OK.

The ingres user is added as a member of the Administrators group.

7. Click OK to close the Properties window and then close Computer Management window.

The user account for the system administrator is defined.

Assign User Rights to the System Administrator

The system administrator account must have the privileges required to perform system administrator tasks.

To assign the required user rights to the system administrator

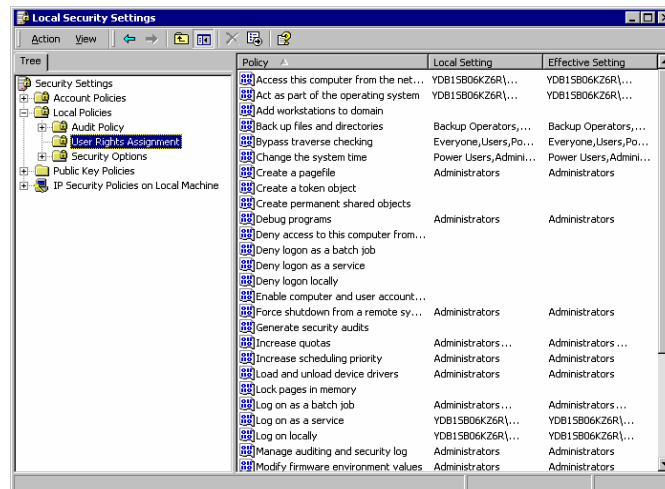
Note: This procedure shows "ingres" as the user name.

1. Click Start, Settings, Control Panel, Administrative Tools, Local Security Policy.

The Local Security Settings window appears.

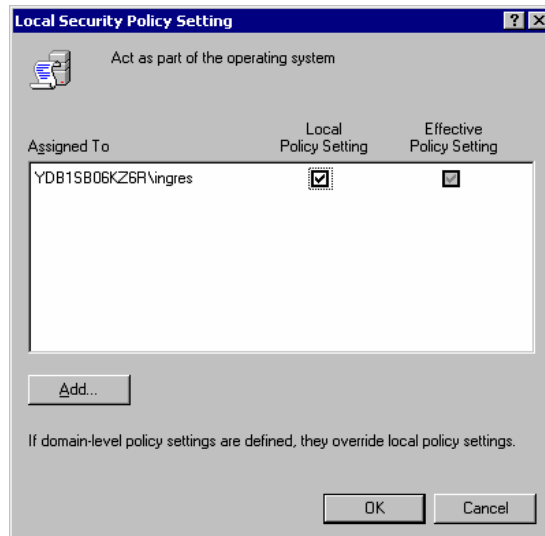
2. Expand the Local Policies branch and select the User Rights Assignment branch.

A list of the user rights appears in the right pane, as shown in this example:



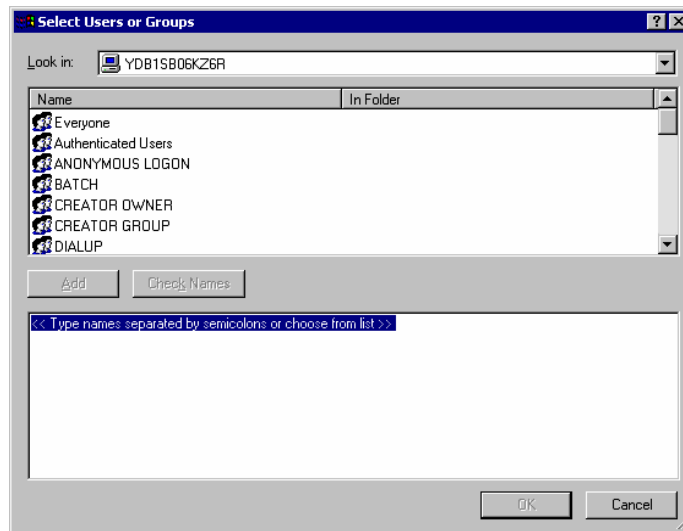
3. Double-click the Act as Part of the Operating System user right.

The Local Security Policy Setting dialog appears, as shown in this example:



4. Click Add.

The Select Users or Groups dialog appears, as shown in this example:



5. Scroll down the list of names and double-click the user.
The user is added to the list of users.
6. Click OK to return to the Local Security Policy Setting dialog, and then click OK to return to the Local Security Settings window.
The Act as Part of the Operating System right is assigned to the ingres user.
7. Repeat steps 3–6 for the Access This Computer from the Network, Log On as a Service, and Debug Programs user rights.
Each of these rights is assigned to the ingres user.
8. Close the Local Security Settings window.

How You Establish Client/Server Connectivity

Client/server connectivity is required by Ingres Net. Before attempting to use Ingres in a client/server configuration, follow this process:

1. Determine whether you can successfully use any of the Windows networking utilities provided by the networking vendor. Ingres Net requires your client and server PCs to be set up using one of the supported networking protocols for Windows according to the instructions in the Windows online help.
2. Ensure that your network protocol software is correctly installed and configured. Verify that there is a working network connection between the client PC and the server where Ingres DBMS Server is to be installed.

Supported Network Protocols on Windows

Ingres supports the following network protocols on Windows:

- **TCP/IP Protocol**—Uses the Microsoft networking protocol. TCP/IP is used to connect to or receive service from any other Ingres installation.
- **NetBIOS Protocol**—Uses the Microsoft LAN Manager networking protocol. NetBIOS is used on a LAN server with the Ingres server.
- **Novell SPX/IPX Protocol**—Uses the Novell Gateway Service to Netware.

Install Ingres on Windows

The installation procedure transfers all pertinent files from the distribution medium to the II_SYSTEM location for your installation on this node.

To start the installation program

1. Log on to your Windows machine and execute the file install.exe located in the root directory of the Ingres distribution.

Note: To install Ingres DBMS Server, you must log on as the installation owner. For client installation, you can log on as any user.

The first page of the Ingres Setup Wizard is displayed.

2. Respond to the Setup Wizard dialogs.

After you provide the required information in the Setup Wizard dialogs, the installation program installs Ingres.

Setup Wizard

The Ingres Setup Wizard on Windows presents a series of dialogs that prompt you for required information.

Key Setup Wizard pages are highlighted here:

Setup Type page

Lets you choose either a Complete or Custom setup. For new users, the Complete setup type is recommended. It installs all default Ingres features, including: DBMS Server, Ingres Net (with TCP/IP protocol), Replicator Option, Web Deployment Option, Data Access Server, ODBC and JDBC drivers, Embedded SQL precompilers, Querying and Reporting Tools, Vision, and Ingres guides.

If you choose not to install a particular component at this time and later find that you need it, you can run the Ingres Setup Wizard again and add that component without affecting the rest of your installation.

The minimum installation must include either Ingres DBMS Server or Ingres Net.

To install an Ingres networked client, choose the Ingres Net option, which includes the Name Server, Communications Server, Data Access Server, ODBC and JDBC drivers, and Terminal Monitors.

Ingres Configuration page

Provides a Cluster Configuration section for installing the Ingres High Availability option. The Cluster Configuration section is available only when you are installing Ingres on a machine that is part of the cluster.

The Ingres High Availability option must be installed on all nodes in the cluster where the Ingres DBMS Server is allowed to failover.

To install the High Availability option, check the Install Ingres High Availability option, and provide an Ingres Cluster Resource Name.

Note: If you choose to install Ingres High Availability option, you must install II_SYSTEM on a non-cluster local drive, and install database, checkpoint, journal, dump, work, and log files on a cluster drive.

Note: If Ingres is installed without the High Availability option, the option cannot be installed at a later time.

For more information on the setup, starting, and stopping of the High Availability Option, see the *System Administrator Guide*.

DBMS Configuration page

Lets you specify locations for various Ingres files. This page also lets you specify whether you want the product to comply with the ANSI/ISO Entry SQL-92 standard.

Multiple Instances on One Node

More than one instance of Ingres can reside on the same node. Each instance must use a unique instance identifier (installation code) and system directory.

Security Limitations and File Permissions

The Ingres database supports the special security features of the NTFS file system.

When you initially install Ingres, the system runs `setperm`, a utility that sets the appropriate file security and permissions for all Ingres files. In general, the default permissions are:

- FULL_CONTROL for the installation owner
- READ and EXECUTE permission for the group "Everyone"

Note: Only the installation owner is given access to the Interactive Performance Monitor file because this tool provides powerful abilities to view information about any user session and the Ingres installation as a whole.

You can modify the permissions to give access to less privileged users. Remember, however, that doing so permits any user to display a large amount of system and other user information. To modify the permissions, use the Security option in the Windows Explorer.

Note: Many files under the `%II_SYSTEM%\Ingres` subdirectory are critical to proper functioning of the Ingres system. You should never modify by hand the files in the `\data`, `\ckp`, `\jnl`, `\dmp`, and `\log` subdirectories. Perform all necessary modifications using Ingres and the appropriate database utilities.

How You Prepare Your Installation for General Use

After Ingres is installed, you must complete additional tasks so that users can access and use the new installation.

To prepare Ingres for general use, follow this process:

1. Establish a valid account on the host with privileges to access the database to which you want to connect.
2. Start and initialize Ingres, as described in Startup and Shutdown (see page 23).
3. Give each user entered into the security facility access to the Ingres DBMS Server. To do so, use either the `accessdb` command or the Create User dialog in Visual DBA. For more information on `accessdb`, see the *Command Reference Guide*. For more information on the Create User dialog, see the online help.
4. On the client, set up Ingres Net connections by using `netutil` or Visual DBA, as described in Ingres Net Connection Settings (see page 23). For more information about establishing communications using Visual DBA, see the online help.

Ingres Net Connection Settings

For an Ingres Net installation, an Ingres server on a host cannot be accessed until a virtual node (vnode) definition is provided on the client for that host.

You must make the following entries for each node:

Virtual Node

Defines a name that identifies the host. This name is a user-defined connection definition.

Note: In replication this name has to be the same as the server to which you are replicating.

Remote Node

Defines the name of the workstation as known by the networking protocol.

Protocol

Identifies the network protocol used by Ingres Net.

Listen Address

Identifies the listen address, which is determined by the installation on the remote node. For a Windows server, it is usually II. Contact your database administrator to determine the proper listen address, and whether it supports the required protocol.

Username

Specifies the name of the user recognized by the operating system on the remote node.

Password

Specifies the operating system password for the specified user on the remote node.

Startup and Shutdown

You can start up and shut down your Ingres installation in the following ways:

- Automatically
- Using Ingres Visual Manager
- Using Ingres Service Manager
- Using the Services Window in Windows
- Using the `ingstart` and `ingstop` commands

Important! After Ingres is installed with the High Availability option, you must start and stop the Ingres installation only from a Cluster Service Manager.

Automatic Startup and Shutdown

During installation, if you chose to start the Ingres DBMS Server as an automatic service upon system startup, Ingres will be shutdown when you log off Windows.

Start and Stop Ingres with Ingres Visual Manager

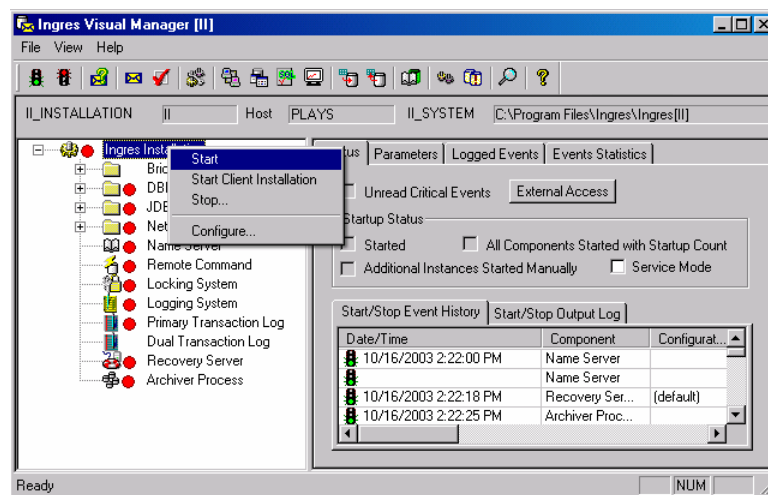
Starting and stopping Ingres is one of the many tasks you can perform with Ingres Visual Manager.

To start and stop Ingres using Ingres Visual Manager

1. Click Start, Programs, Ingres, Ingres Visual Manager.

The Ingres Visual Manager window appears.

2. Right-click the Ingres Installation branch and choose Start, as shown in this example:



Red icons turn green as the various components in the installation are started.

3. Right-click the Ingres installation branch and click Stop.

The installation is stopped.

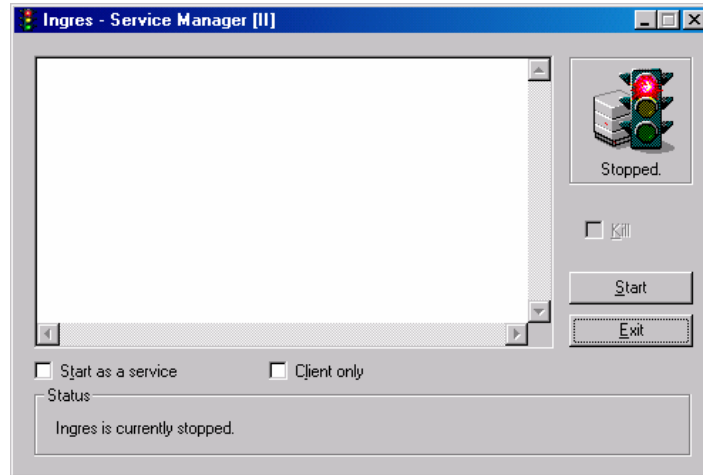
Start and Stop Ingres with the Ingres Service Manager

The Ingres Service Manager lets you start Ingres as a service.

To start and stop Ingres using the Ingres Service Manager

1. Click Start, Programs, Ingres, Ingres Service Manager.

The Ingres - Service Manager window appears, as shown here:



2. Check the Start as a service check box. Check the Client Only check box to start only those components for a client installation. Click Start to start the installation.

The Ingres installation is started, and the output of the startup operation is displayed in the scrollable list box. The Start button changes to Stop.

3. Click Stop

The installation is stopped.

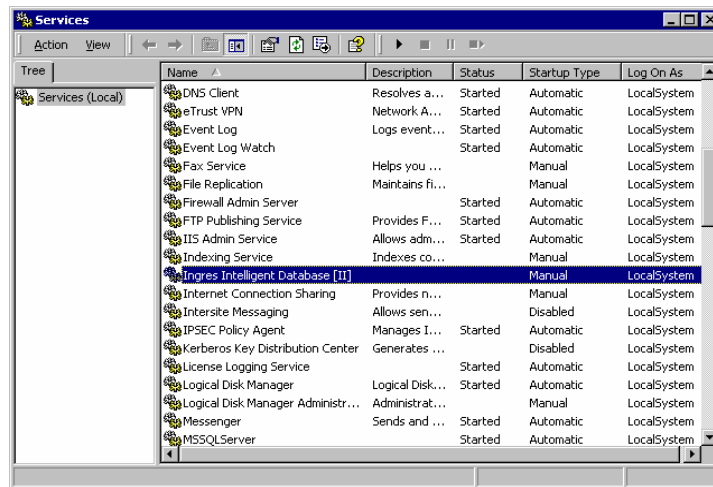
Start and Stop Ingres with the Services Window

You can start and stop Ingres as a service using the Services window in Windows. You can use this method to have the Ingres service start automatically when Windows is started.

To start and stop Ingres with the Services window in Windows XP

1. Click Start, Settings, Control Panel, Administrative Tools, Services.

The Services window appears.



2. Double-click the Ingres Intelligent Database service.

The Ingres Intelligent Database Properties dialog appears.

3. Select Automatic or Manual from the Startup Type drop-down list on the General tab.

Automatic

Starts and stops Ingres as a service automatically at Windows startup and shutdown.

Manual

Starts and stops Ingres when you click Start (or Stop) on this dialog.

4. Click the Log On tab, select the This Account option, and then enter the user ID of the installation owner in the corresponding text box. Enter the case-sensitive password for the installation owner account in both the Password and Confirm Password text boxes, and then click OK.

The service is configured to run on the installation owner account.

Note: The Ingres database must be started by the installation owner and the password must be the same one used when this user logs on to the operating system.

Tip: Whenever the password is changed for the user using the Computer Management window, it must also be changed for the Ingres Intelligent Database service, using the Services window.

5. Close the Windows Services window.

Start and Stop Ingres with System Commands

One way to start and stop Ingres is to issue the `ingstart` and `ingstop` commands.

To start and stop the Ingres installation at the command prompt

1. Right-click the Ingres installation icon in the systray and choose Ingres command prompt.

The Ingres command prompt appears.

2. Type the following command:

```
ingstart
```

To start Ingres as a service, type the following instead:

```
ingstart -service
```

The installation is started.

3. Type the following command:

```
ingstop
```

The installation is stopped.

Note: If the installation owner logs off before `ingstop` is issued, all processes are killed ungracefully.

How You Safely Uninstall Ingres

Removing Ingres is an irreversible event with pervasive effects. Any products or applications that shared the removed DBMS Server are affected, as follows:

- Any future attempt to connect to this database will fail.
- If you re-install Ingres, you may not be able to reference the data files.

If you know you want to remove an Ingres installation, follow this process:

1. If you want to keep the data files for later use, you must run `unloaddb` against each database before removing Ingres. Doing so will allow you to reference the data files easily if you re-install Ingres later. For details on the `unloaddb` command, see the *Database Administrator Guide* and the *Command Reference Guide*.
2. If you do *not* want to keep the data files, you can run `destroydb` against each database before removing Ingres. The `destroydb` command locates and deletes all data files. For details on the `destroydb` command, see the *Command Reference Guide*.
3. Uninstall Ingres.

Uninstall Ingres on Windows

The Ingres uninstall program removes all binary files.

To uninstall Ingres

1. Click Start, Settings, Control Panel, Add or Remove Programs.

The Add or Remove programs window appears.

2. Select the Ingres installation you want to remove.

Note: If multiple instances installed, be sure to select the one you want to remove. Each instance is identified by a unique installation ID.

3. Click Add/Remove.

The Ingres installation wizard is started.

4. Follow the installation wizard instructions to remove Ingres.

Ingres binary files and any data files residing in II_SYSTEM are removed.

Chapter 3: Installing Ingres on UNIX

This chapter describes pre-installation tasks for installing Ingres in UNIX environments and shows you how to install and start the product. It then describes post-installation tasks.

System Requirements on UNIX

Disk space and memory requirements depend upon several factors such as number of users, size of the transaction log file, number and size of databases, and so on.

Ingres has the following hardware requirements and recommendations:

Element	Typical Requirements
Disk space	<p>The amount of space required on any one disk is determined by the number of disks in your configuration, the packages you are installing, and the locations you choose for your files.</p> <p>The default file size for your primary and backup transaction log files is 32 MB. The recommended size is between 250 and 400 MB, or even larger.</p> <p>For help in determining space requirements for Ingres files, see the <i>Database Administrator Guide</i>.</p>
Physical memory	128 MB are required and 512 MB or more are recommended for a DBMS Server installation.

Note: For hardware and software requirements specific to your platform, check the Readme file.

How You Prepare for Installation on UNIX

You should thoroughly understand the issues regarding system resources, storage locations, and other configuration parameters before installing Ingres. If you are not sure, have someone more knowledgeable in these areas perform the installation planning.

Before installing Ingres on UNIX, do the following:

- Verify system requirements. (For requirements, see the Readme.)
- Know what comprises an Ingres installation.
- Know how you want to configure your installation.
- Create the system administrator account.
- Create the directory for system files for Ingres and Ingres tools.
- Decide file locations.
- Complete the UNIX Installation Worksheet, provided as an appendix in this guide.
- Choose installation mode (Express Install, Interactive, or command line).

An Ingres Installation

An Ingres installation consists of a set of product components that share a unique system-file location, ownership, and installation code.

You can configure an installation in many ways, depending on the products you install and the parameters you set. For example, you can configure an installation as a stand-alone system or as a client that accesses databases on a remote DBMS Server installation. A network can contain many different types of installations.

Multiple Instances on One Node

More than one instance of Ingres can reside on the same node. Each instance must use a unique instance identifier (installation code) and system directory.

Major Configuration Options

Initially, you can configure your installation as one of the following major types. Later, you can install other products or modify parameter settings to add more capabilities to your installation. For example, you can add networking capabilities to a stand-alone installation that is connected to a network. Or you can add client capabilities to an installation that you initially configured as a networked DBMS Server.

The major configuration options are as follows:

Stand-alone DBMS Server

Provides only local access to local databases. This installation includes the Name Server, DBMS Server, and its own set of tools.

Required products: DBMS Server, tools

Networked DBMS Server

Allows remote clients to access its databases through a network. (If tools are installed, local users also can access its databases.)

This installation includes the Name Server, DBMS Server, Communications Server, Data Access Server, ODBC driver, and JDBC driver.

By installing Ingres tools and then modifying the Ingres Net connection data, you can add outgoing client capabilities to a networked DBMS Server installation. Doing so enables it to act both as a client of a remote DBMS Server and as a DBMS Server to its own remote clients.

Required products: DBMS Server, Ingres Net, ODBC driver, JDBC driver, Ingres tools (optional, but required for local access to local databases)

Networked DBMS Server with Ingres Distributed Option

Allows access to multiple databases—local and remote, Ingres and non-Ingres—simultaneously. This installation includes Ingres Distributed Option, Name Server, DBMS Server, Communications Server, Data Access Server, ODBC driver, and JDBC driver. It may also contain Ingres tools.

Required products: DBMS Server, Ingres Net, ODBC driver, JDBC driver, Ingres Distributed Option, Ingres tools (optional)

Client

Has its own set of Ingres tools and accesses databases on a networked DBMS Server installation on a remote node. This installation includes the Name Server, Communications Server, Data Access Server, ODBC driver, JDBC driver, and Ingres tools. It does not contain the DBMS Server.

You can configure a networked DBMS Server installation as a client of another DBMS Server on a remote node. To do so, install Ingres tools on the DBMS Server, and then add client capabilities by modifying the Ingres Net connection data.

You can set up a client in a different environment to access an Ingres database in your current environment. For example, a client in a Windows environment can access a database in a Linux environment. For more information, see the *Connectivity Guide*.

Required products: Ingres Net, ODBC driver, JDBC driver, Ingres tools

Network File System (NFS) Client

Uses a Network File System to share all Ingres files on a networked DBMS Server installation. This installation contains no Ingres files on its own node.

Required products: A networked DBMS Server installation on a node in the Network File System. The `ingmknfs` utility must be run to create the NFS client installations and configure the DBMS Server for NFS-client use.

System Administrator Account

The system administrator account is a user account that is used for system management on each Ingres installation. The system administrator account owns the installation, and so the system administrator is often referred to as the installation owner.

This account must be created before installing the DBMS Server. You must install Ingres under this account because every DBMS system file requires ownership by this user.

Note: Use the system administrator account only for Ingres system management work. We recommend that you do not put non-Ingres files in this account.

System Administrator Account Privileges

The system administrator must have privileges to:

- Perform system administration functions (such as starting and stopping servers)
- Create databases
- Establish other users and grant privileges to them

How You Create the System Administrator Account on UNIX

Only the system administrator (installation owner) can install Ingres, therefore, you must create this account before installing the product.

Follow this process to create the system administrator account:

1. Log in to your system through the root account.

If you do not have access to this account, have the UNIX system administrator complete this procedure or log in for you.

2. Set up an account with a login name of your choice. (The default is "ingres.")

This account should have a user identification code (UID) greater than 100.

3. Add this user to the kmem group in the /etc/group file, as described in your operating system documentation.
4. Make sure that /dev/kmem is in the kmem group and that its permissions are set to "group read." For example:

```
%ls -lgL /dev/kmem
crw-r----- 1 sys 13, 1 Jun 19 09:05 /dev/kmem
```

Note: Check the Readme file for your operating system for any variation in this procedure.

System Directory (II_SYSTEM)

The system directory, called the ingres directory, will contain your installation's system files (executables). It will also contain the error logs and configuration files that are created after the installation process. The location of this directory is stored in the II_SYSTEM environment variable. Choose a location that has adequate disk space.

The install program creates the appropriate subdirectories in the \$II_SYSTEM/ingres directory. For more information about the directory structure for your installation, see DBMS Server Disk Configurations.

Note: Do not delete or alter any files that the install process places into the \$II_SYSTEM/ingres directory and its subdirectories. Also, do not place any user files into this directory. Lastly, do not alter the permissions on this directory and its subdirectories or on any files in this directory structure. Doing so compromises the security and integrity of your databases.

Complete the Installation Worksheet

Before installing Ingres, you should record file locations and values for other installation parameters on the installation worksheet (provided as an appendix in this guide). These entries will serve as ready responses to the installation program prompts.

To complete the worksheet

1. Make a copy of the blank Installation Worksheet for each installation you intend to create.
2. Fill in values for the required parameters.

Note: In a cluster installation, a few of the worksheet values must be supplied for each node.

3. Keep the completed worksheet for future reference.

File Locations

Before installing Ingres, you must decide on locations for the Ingres system (executable) files, databases, transaction log, checkpoint, journal, dump, and temporary work files.

Fill in these locations on your Installation Worksheet.

The disk configuration diagrams that follow can help you to decide on file locations.

For more information about file locations, see the appendix "General Reference."

Installer-defined Directory

In the diagrams that follow, the installer-defined directory ("inst.-def. dir.") indicates a location chosen by the installer. In the installer-defined directory, the install program creates an appropriate directory tree in which it stores the appropriate files.

When specifying a file location, use only the path name for the installer-defined directory at the top of the directory tree. Do not include the subdirectories that the install program creates in the installer-defined directory.

DBMS Server Disk Configurations

Your Ingres installation can use from one to four or more disks.

To avoid a single point of failure, we recommend *at least* a two-disk installation.

For any server configuration, you can set up an optional backup transaction log device on a separate disk from the primary transaction log. This setup enables recovery of unsaved, committed transactions if the primary transaction log device fails.

Four-Disk DBMS Server Configuration

A configuration with four or more disks provides the best performance and recovery options. For best performance, configure your system with the operating system on a separate disk and your Ingres files on three or more other disks, as follows:

Disk 1—Operating system files

Disk 2—Checkpoint, journal, and dump files

Disk 3—Product system files, and transaction log work files

Disk 4—Databases

If possible, put your backup transaction log on a separate disk from both your database and primary transaction log. Also, you can use more than one disk partition for your transaction log.

Three-Disk DBMS Server Configuration

The following three-disk configuration provides better performance and recovery than a two-disk system:

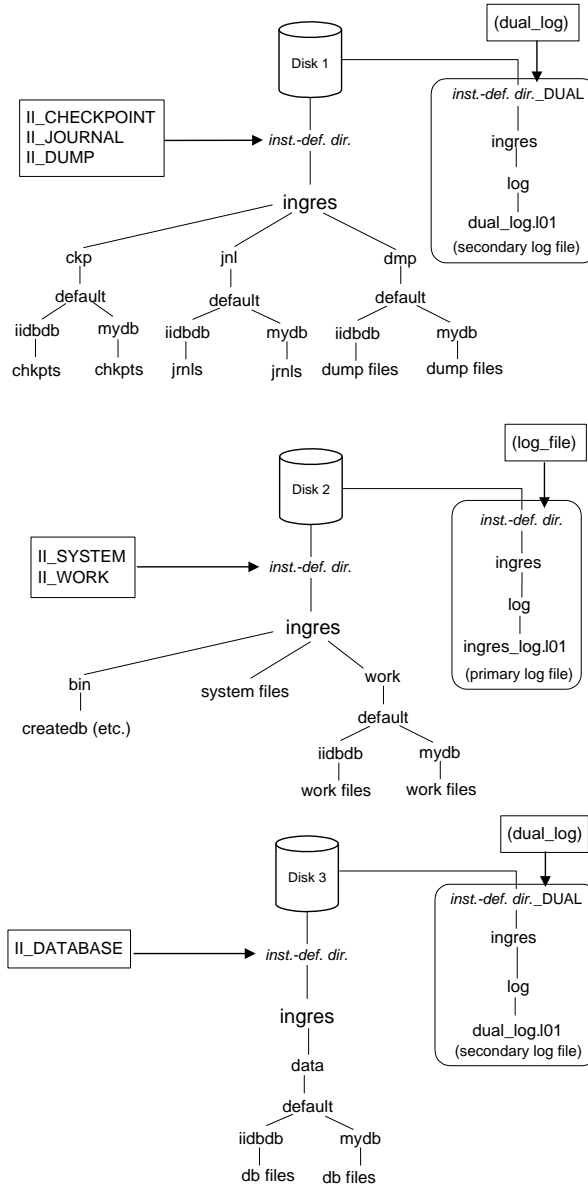
Disk 1—Operating system, checkpoint, journal, and dump files

Disk 2—Product system files, transaction log, and work files

Disk 3—Databases

Your backup transaction log can reside on either Disk 1 or Disk 3, as indicated by the oval surrounding its directory tree and the parentheses around the `log_file` and `dual_log` configuration parameters in the following diagram.

If Disk 3 fails, you can recover databases and committed transactions. If Disk 2 fails, you can recover your committed transactions if you have a backup transaction log; if you have no backup log, you will lose committed transactions that were not written to the database.



Two-Disk DBMS Server Configuration

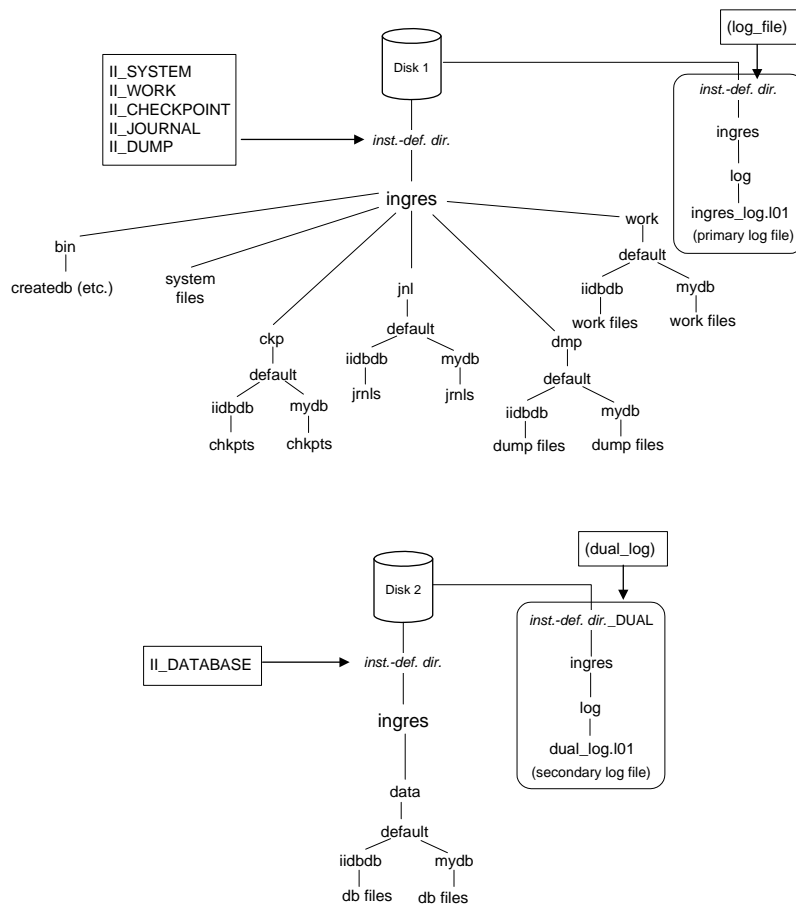
A two-disk system is the minimal recommended configuration:

Disk 1—All Ingres files except for those on Disk 2

Disk 2—Databases, optional backup transaction log file

If Disk 2 fails, you can recover databases and committed transactions. However, if Disk 1 fails and you do not have a secondary log device, you will lose unsaved, committed transactions.

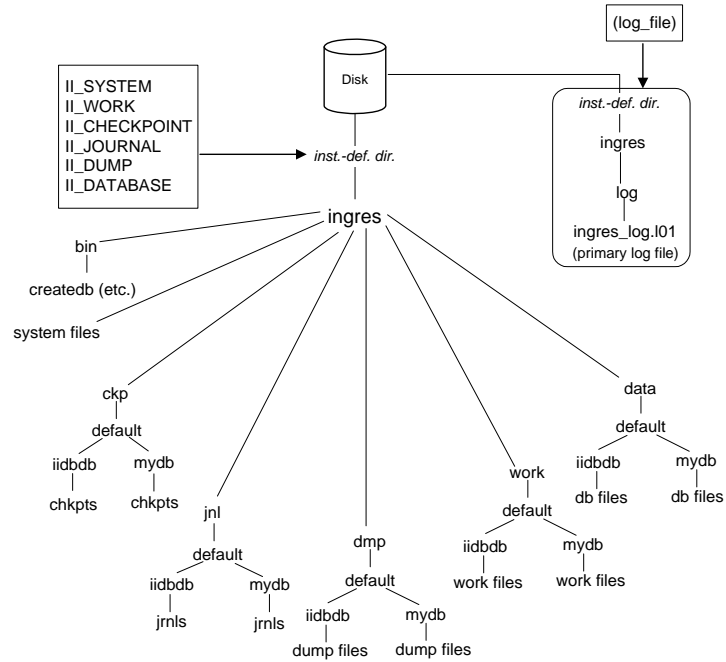
The following illustrates a sample two-disk DBMS Server configuration:



One-Disk DBMS Server Configuration

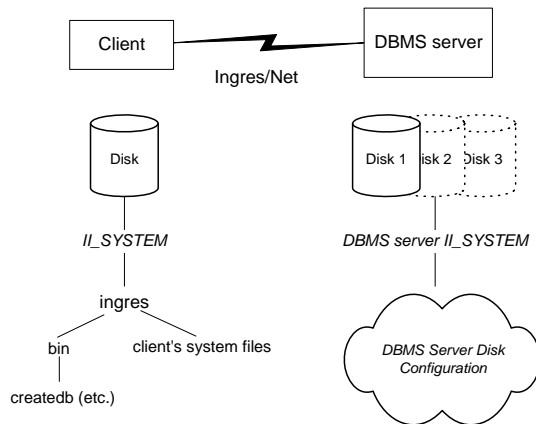
A single-disk system is a high-risk setup and not recommended. If the disk fails, you could lose all your data. On single-disk systems, you should checkpoint to magnetic tape.

The following illustrates a sample one-disk DBMS Server configuration:



Client-only Disk Configuration

In the Client configuration, the Ingres Net and Ingres tools system files, reside on a single disk on the client installation. The Ingres DBMS Server executables reside on the networked DBMS Server installation.

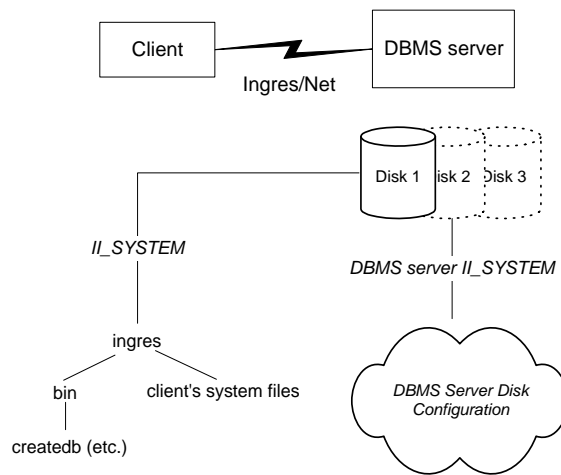


NFS Client Disk Configuration

In the Network File System (NFS) configuration, no files reside on the NFS client installation. All Ingres files reside on the networked DBMS Server installation.

The NFS client installation uses the Network File System to share executables and other Ingres files. The `ingmknfs` utility, which you use to create and configure NFS clients, creates an NFS admin directory on the DBMS Server installation to store NFS client-related files.

Here is an illustration of an NFS client disk configuration:



How You Install and Configure Ingres in a UNIX Environment

The process for installing and configuring Ingres on UNIX is as follows:

1. **(Optional) Set environment variables**—Define default values for your terminal type and distribution medium before running the install program, as described in Set TERM_INGRES (see page 55) and Set II_DISTRIBUTION (see page 56).
2. **Install the software**—Install the software in the correct locations with the correct permissions.
3. **Run setup programs**—Set required configuration parameters for installed components by running the setup programs.

Note: This step is necessary only if the install procedure did not include this step, for example, if you used the Install method in Interactive mode.

4. **Start Ingres**—Start Ingres on your system so the system administrator can access it.
5. **Customize your installation**—Set optional configuration parameters to allow Ingres to run as desired.
6. **(Optional) Set up raw log file**—Set up a raw log file to be used in place of the default transaction log file, as described in Transaction Log File as a Raw Device (see page 58).
7. **Prepare Ingres for general use**—Perform additional tasks needed to prepare the product for its users, such as creating an automatic boot command, authorizing users, and creating databases.

Installation Modes

Ingres on UNIX can be installed using one of the following modes:

- **Express Install mode**—In this mode, Ingres is completely installed in the default location using default configuration values, without any installation prompts.
- **Interactive mode**—In this mode, you use a forms-based install utility. The interactive install utility tells you how the installation process is progressing and lets you make decisions about how to proceed with the installation. Your actual installation and setup script output is saved to a file called install.log in the \$II_SYSTEM/ingres files directory.
- **Command line mode**—In this mode, you enter a sequence of commands at the operating system prompt. After you enter the installation command (and any optional flags), the installation procedure runs without interruption, choosing built-in default actions rather than waiting for your responses.

Installation Procedure Considerations

The installation procedure transfers all pertinent files from the distribution medium to the II_SYSTEM location for your installation on this node.

Note: Before running the install program, make a complete backup of your system.

If a single installation is to have both DBMS Server and client capabilities, first install Ingres as a networked DBMS Server. Then set up the installation's client capabilities using the netutil utility, or the Network Utility or Visual DBA (if available). For details, see the *Connectivity Guide*.

If you intend to create client installations that access a remote networked DBMS Server installation, install Ingres on your DBMS Server node first.

You cannot use the install program to create NFS client installations, which are described in How You Install and Configure NFS Clients (see page 52).

ingres_express_install Command—Install Ingres

The ingres_express_install command quickly installs all Ingres packages.

If you set II_RESPONSE_FILE to point to a valid response file, then you can install Ingres with the configuration defined in that response file.

This command has the following format:

```
ingres_express_install [installation_ID]
```

installation ID

Specifies the Ingres installation ID to use for the installation.

Examples: ingres_express_install Command

This command installs all packages in the current working directory with the default configuration:

```
ingres_express_install
```

This command installs all packages with the default configuration, but with an installation ID of A1:

```
ingres_express_install A1
```

Install Ingres in Interactive Mode

In interactive mode, you install Ingres using a form-based utility.

To install Ingres on UNIX using the forms-based Ingres Installation Utility

1. Log in as the root user.
2. Insert the CD-ROM into the drive and mount the drive from a local host (if not mounted automatically) or extract all files from the “CD Image” saveset that was downloaded from the Ingres web site to a local directory.
3. Change to the root directory on the CD-ROM or the directory where you extracted the “CD Image” saveset files, and enter the following command to run the install utility:

```
% install.sh
```

The forms-based Ingres Installation Utility is started.

4. Respond to the install dialogs.

Ingres components are installed on your system.

Forms-based Ingres Installation Utility

The forms-based Ingres Installation Utility presents a series of dialogs that prompt you for required information.

Some of the dialogs are highlighted here:

Setup Type page

Lets you choose the setup type, which can be one of the following:

Package

Lets you install one or more pre-configured packages.

The Full Installation package installs all default Ingres features, including DBMS Server, Ingres Net (with TCP/IP protocol), Replicator Option, Web Deployment Option, Data Access Server, ODBC and JDBC drivers, Embedded SQL precompilers, Querying and Reporting Tools, Vision, and Ingres guides.

The Package setup type is recommended for new users.

Custom

Lets you select individual components.

If you choose not to install a particular component at this time and later find that you need it, you can run the Ingres Installation Utility again and add that component without affecting the rest of your installation.

The minimum installation must include either Ingres DBMS Server or Ingres Net.

To install an Ingres networked client, choose the Ingres Net option, which includes the Name Server, Communications Server, Data Access Server, ODBC and JDBC drivers, and Terminal Monitors.

Custom Component Options page

Lists the components available for installation. A brief description of the component is available by highlighting a component and then selecting Getinfo.

Interactive Mode Installation Method

In interactive mode, after you select the Package or Custom option for installing product components, you must choose one of the following installation methods:

- **Install**—The Install (standard) option lets you customize your installation. This method consists of two separate steps—installation and setup; it does *not* configure parameters automatically.
- **ExpressInstall**—The ExpressInstall option lets you install and set up Ingres without prompting for configuration options. This method sets up configuration parameters using default settings.

This table compares the Install and ExpressInstall methods:

Task	Install	ExpressInstall
Defining installation parameters	User-defined. You can customize them to what you want.	Default. The value for II_TIMEZONE_NAME will be NA-PACIFIC until you change it using <code>ingsetenv</code> .
Completing the setup procedure	User-defined. The setup procedure consists of a script, which prompts you for values. You can perform the setup procedure whenever you wish.	Automatic. You cannot affect the setup procedure.
Upgrading from a previous release	Optional prompt. You can choose to upgrade your databases during the setup procedure.	Does not prompt. Your installation is upgraded, but your databases are not. You must run <code>upgradedb</code> to upgrade your databases after the installation is complete. (For details, see the <i>Database Administrator Guide</i> .)
Specifying file locations	User-defined. You specify where you want files to be located, up to four or more disks.	Automatic. All files are put in the default directory of II_SYSTEM on one disk.

Task	Install	Express Install
Specifying the installation code	User-defined. You specify the installation code during the setup procedure.	Default. The default value is used unless you define the installation code before starting the installation procedure.
Setting Ingres Net passwords	Optional prompt. You can define Ingres Net passwords during the setup procedure.	Does not prompt. You must define Ingres Net passwords after you complete the installation procedure.

Install Ingres in Command Line Mode

In command line mode, you can completely automate and customize your install by supplying the appropriate arguments to the `ingbuild` command at the operating system prompt.

Ingbuild Command—Install Ingres

The `ingbuild` command installs Ingres. `ingbuild` runs in interactive mode if you specify no command line arguments or only `-mkresponse` or `-exresponse`.

If you specify a distribution medium on `ingbuild`, the installation process runs without interruption. It also automatically starts any needed setup programs for the installed products, unless the `-nosetup` option is specified.

This command has the following format:

```
ingbuild [flag] [distribution_medium]
```

flag

Specifies an install flag. The flag can be *one* of the following:

-all

Installs all products.

-install=*list*

Installs only those products you list. Use commas to separate items in the list.

-products

Displays a list of the products on the distribution medium, which you can then specify with the -install flag.

-version[=*list*]

Displays the version number of the installation or of each product name in a list. Use commas to separate items in the list.

-express

Runs setup programs using default values.

-ignore

Ignores any errors encountered during file copy.

-nosetup

Does not run setup programs.

-mkresponse

Creates a response file that contains install parameters, but does not install the product.

-exresponse

Reads installation parameters from a response file.

-file=*filename*

Identifies a file name for use with -mkresponse or -exresponse.

Default: ingrsp.rsp

-help

Displays ingbuild command options.

distribution_medium

Specifies the name of the distribution medium on which the software to be installed resides. This parameter is required with the `-all`, `-install`, `-express`, `-ignore` and `-nosetup` flags. If a distribution medium is provided with no flag, `-all` is assumed. The distribution medium is one of the following:

- A physical device, such as a magnetic tape drive
- The `ingres.tar` file on the CD-ROM or from the “CD-ROM image” `saveset`, with full path (for example: `/cdrom/ingres.tar`)
- A disk file containing an `ingres.tar` image copied from the distribution medium

Examples: ingbuild command

- This command displays `ingbuild` options:

```
% ingbuild -help
```

- This command lists all product names before installing them:

```
% ingbuild -products
```

- This command installs all products:

```
% ingbuild -all distribution_medium
```

Setup Programs

The setup programs set configuration parameters that are required to run certain Ingres components. You must run the setup programs if the installation process did not perform this step—for example, if you used the Install method in Interactive mode—or if you want to change the default values.

Not all components require setup, and many can be set up without user input. The setup programs for the Ingres DBMS Server and Ingres Net components require and prompt for user input. You should refer to your completed Installation Worksheet when running the setup programs.

Running the setup programs for most components takes only a few minutes; running the setup program for the DBMS Server takes significantly longer.

If you are running the setup program for an upgrade installation, the programs prompt you only for those parameters you are allowed to change.

Details on setup program tasks are described in How the DBMS Server Setup Program Works (see page 141).

Run the Setup Programs

The setup programs configure the installed components.

If any of the installed components require configuration, you can run the Setup programs automatically by responding Yes to the installation program prompt "Do you want to set up these products now?" in interactive mode.

After installing Ingres components, you can run the setup programs at any time from the Currently Installed Components screen (see page 65).

The order in which you run the setup programs is important. For a networked DBMS Server installation, run the setup program for the DBMS Server **before** running Ingres Net Setup. Ingres Net Setup can then use several of the values you specified for the DBMS Server.

To run the setup programs from the Currently Installed Components screen

1. Choose SetupAll to run the setup programs for all components that require it.

The setup programs execute one after another, in an appropriate order.

Note: If you need to set up components individually, highlight the appropriate row for the component you want to set up and choose Setup from the menu.

2. Respond to the program prompts.

When setting up required parameters, default values sometimes appear in brackets after the prompt. To accept a default value, press Return. Otherwise, enter an appropriate value from your Installation Worksheet and press Return.

The Setup program(s) prepare each component for use.

How You Install and Configure NFS Clients

You create and configure NFS client installations using the `ingmknfs` utility, rather than the install and setup programs.

The process for installing and configuring an NFS client is as follows:

1. Install the Ingres DBMS Server, Ingres Net, and Ingres tools components as a networked DBMS Server.
2. Run the `ingmknfs` utility to create the NFS client installations and configure the DBMS Server for NFS-client use (that is, create the NFS admin directory and related NFS-client files).

You can issue the `ingmknfs` command in either of the following ways:

- On each NFS client, individually. With this method, you can establish Ingres Net authorizations by responding to program prompts.
- On the Ingres DBMS Server installation only, using a parameter list of all the NFS client installations you want to set up. With this method, you must run the `netutil` utility on each NFS client to establish Ingres Net authorizations. You must establish an installation owner account that has the same numeric ID (UID) as the installation owner account on the DBMS Server.

Set Up Each NFS Client Individually

To set up each NFS client individually, follow these steps:

1. Make sure you have run the Ingres DBMS Server and Ingres Net setup programs on the Ingres DBMS Server installation, as described in Run the Setup Programs (see page 51).
2. Define `II_SYSTEM` as it appears on the client, where *pathname* is the path for the directory in the client's file system that is the NFS-mounted, shared `II_SYSTEM` directory on the Ingres DBMS Server installation.

For C shell:

```
% setenv II_SYSTEM pathname
```

For Bourne shell:

```
$ II_SYSTEM=pathname; export II_SYSTEM
```

Details are described in NFS Client Parameters (UNIX) (see page 136).

3. Set your path appropriately.

For C shell:

```
% set path=($II_SYSTEM/ingres/{bin,utility} $path)
```

```
% rehash
```

For Bourne shell:

```
$ PATH=$II_SYSTEM/Ingres/bin:$II_SYSTEM/ingres/ utility:$PATH
$ export PATH
```

4. Issue the following command on each NFS client at the operating system prompt:

```
% ingmknfs
```

5. Provide the following information in response to program prompts. Refer to your completed NFS Client Worksheet (see page 146).
 - Installation code for this client that is unique on this node
 - World region in which this client is located
 - Name of the time zone in which this client is located

The program then asks:

Do you want to authorize any users at this time? (y/n) [y]

6. Enter **y** to create an authorization entry at this time for yourself or for all users, to enable access to the default Ingres DBMS Server. When prompted to do so, enter the installation password for this client's Ingres DBMS Server (host) installation.

Enter **n** if you prefer to create the authorization entry later, using either the netutil utility (see the *Command Reference Guide*), or the Network Utility or Visual DBA (see the *Connectivity Guide*).

When done, you are returned to the operating system prompt.

7. Start up the Ingres DBMS Server installation and each NFS client installation with Ingres Visual Manager or the ingstart command on each node, as described in Start the Ingres Installation (see page 57).
8. Make sure that the Ingres startup procedure has succeeded and the Name Server and Communications Server are now running on each client node.

Set Up NFS Clients from the DBMS Server

To set up one or more NFS clients from the server, follow these steps:

1. Make sure you have run the setup program for the Ingres DBMS Server and Ingres Net components on the DBMS Server installation, as described in Run the Setup Programs (see page 51).

2. From the DBMS Server node, enter the following command at the operating system prompt, in which *host* is the name of each NFS client installation that you want to set up:

```
% ingmknfs host {host}
```

For example, if your DBMS Server node is "sales" and your client nodes are "region1," "region2," and "region3," you would enter the following command on the DBMS Server node:

```
% ingmknfs region1 region2 region3
```

3. Provide the following information in response to the program prompts. Refer to your completed NFS Client Worksheet (see page 146).

- Value of II_SYSTEM as it appears on the client, as described in NFS Client Parameters (see page 136).
- Installation code for this client that is unique on this node
- World region in which this client is located
- Name of the time zone in which this client is located

When done, you are returned to the operating system prompt.

4. Define II_SYSTEM on the client, where *pathname* is the path for the directory in the client's file system that is the NFS-mounted, shared II_SYSTEM directory on the DBMS Server installation:

```
% setenv II_SYSTEM pathname
```

5. Set the path on the client.

For C shell:

```
% set path=($II_SYSTEM/ingres/{bin,utility}) $path  
% rehash
```

For Bourne shell:

```
$ PATH=$II_SYSTEM/ingres/bin:$II_SYSTEM/ingres/utility:$PATH  
$ export PATH
```

6. Start up the DBMS Server installation and each NFS client installation with Visual Manager or the `ingstart` command on each node, as described in Start the Ingres Installation (see page 57).
7. Make sure that the Ingres startup procedure has succeeded and the Name Server and Communications Server are now running on each NFS client node.

8. On each NFS client node, establish Ingres Net authorizations using either the netutil utility (see the *Command Reference Guide*), or the Network Utility or Visual DBA (see the *Connectivity Guide*).

Set TERM_INGRES

The TERM_INGRES environment variable defines the terminal type you are using. You can enter a value for the TERM_INGRES environment variable in response to a prompt during installation or prior to running the install program.

To set TERM_INGRES

Enter the following command at the operating system prompt:

```
% setenv TERM_INGRES Ingres_terminaltype
```

For example, the following command defines your terminal as a VT100.

For C shell:

```
% setenv TERM_INGRES vt100
```

For Bourne shell:

```
$ TERM_INGRES=vt100; export TERM_INGRES
```

Set II_DISTRIBUTION

The II_DISTRIBUTION environment variable stores the full path name for the device or file containing the Ingres distribution.

You can enter a value for the II_DISTRIBUTION environment variable in response to a prompt during installation or prior to running the install program.

Note: For faster file transfer during the installation process, you can copy the contents of the distribution medium to a disk file as an intermediary step, and then specify the disk file as the *pathname* for II_DISTRIBUTION.

To set II_DISTRIBUTION, enter the following command at your operating system prompt:

For C shell:

```
% setenv II_DISTRIBUTION pathname
```

For Bourne shell:

```
$ II_DISTRIBUTION pathname; export II_DISTRIBUTION
```

Start the Ingres Installation

After you have installed the software and set up the required configuration parameters for each component, you are ready to start your installation.

Note: If you are using a raw device for your transaction log file, you must configure the log file before starting your installation.

Note: If your operating system has shadow passwords, you must install the password validation program (see page 63) before starting a networked DBMS Server installation.

To start your installation on UNIX

1. Log on to your system through the system administrator account for your installation.
2. If necessary, shut down any components of your installation that are running currently, using the following command:

```
% ingstop
```

The installation is stopped.

3. Enter the following command to start your installation:

```
% ingstart
```

The `ingstart` command checks whether you have sufficient operating system resources to run the Ingres components, and whether the raw log file (if used) is configured. If these conditions are met, `ingstart` starts all servers that are part of your installation.

How You Further Customize Your Installation

After Ingres is installed, configured, and started, you may need to perform the following additional tasks:

- Change default values for some configuration parameters to suit your particular needs or enhance performance.

The default configuration installed by the setup programs is suitable for moderate hardware (about 512 MB of memory) and a moderate number of users (about 32). You may need to change the size of the transaction log file or the number of concurrent users (`connect_limit`).

To change parameter settings, use the Configuration-By-Forms utility or the `ingsetenv` command.

Note: Some changes, such as to the logging system, should not be made while the DBMS Server is running. Changes made with Configuration-By-Forms while servers are running are not effective until you restart the servers.

- Set up virtual nodes, remote user authorizations, and connection data, as needed, for DBMS Server and client installations. Use the Net Management Utility (`netutil`) or Visual DBA, if available.

If you installed Ingres Net for the first time and did not define the DBMS Server password on the server or client nodes, add authorization entries that enable clients to access databases on the DBMS Server node.

If you are upgrading an existing installation or adding Ingres Net to your installation, your existing definitions remain in effect. For more information, see the *Connectivity Guide*.

- Add client capabilities to a networked DBMS Server by setting up the appropriate Ingres Net client parameters. For details, see the *Connectivity Guide*.
- Set up and configure a raw log device (see page 58) in place of the default transaction log file.

Transaction Log File as a Raw Device

The transaction log file can be a raw device rather than an ordinary file system file. A raw device is a disk partition without a file system. This avoids file system overhead for disk input and output. Ingres supports use of a raw device for the transaction log files as a high-performance option.

By default the install process creates the log file as an ordinary file. After Ingres is installed, you can create and configure the transaction log file as a raw device.

Location of Your Raw Log File (UNIX)

The following restrictions apply to the locations for a raw log file:

- They must be in their own partitions.
- They must not contain a file system.
- They must not be raw devices used by another program.

Create and Configure the Raw Log File (UNIX)

After Ingres is installed, you can create and configure the transaction log file as a raw device.

Note: Check the Readme file for any variations to this procedure that are specific to your platform.

To create and configure a raw log file

1. Log in to your system as the root account.
(If you do not have access to this account, have the UNIX system administrator complete this procedure or log in for you.)
2. Create the raw devices in the locations you have chosen.
For more information about creating a raw device, see the UNIX documentation.
3. Use the `ls` command to verify that you have two special devices available for each raw location. Enter the following command:

```
ls -l /dev
```

This command should return output similar to this example:

```
crw-r----- 1 root 17, 3 Dec 16 12:52
/dev/rsd1d
brw-r----- 1 root 11, 3 Dec 16 12:52
/dev/sd1d
```

4. Go to the location of your installation's system files.

For C shell:

```
% setenv II_SYSTEM dirname
% set path = ($II_SYSTEM/ingres/{bin,utility} $path)
% cd $II_SYSTEM/ingres
```

For Bourne shell:

```
$ II_SYSTEM=dirname
$ export II_SYSTEM
$ PATH=$II_SYSTEM/ingres/utility:$II_SYSTEM/ingres/
  bin:$PATH
$ export PATH
$ cd $II_SYSTEM/ingres
```

5. Issue the following command:

```
% mkrawlog
```

The mkrawlog command:

- Requests the full path name of the raw device files.
- Sets Ingres as the owner of all devices. Checks that the locations and sizes of the raw devices are valid.

Note: All raw partitions of a multi-partition raw log file must be the same size.

- Sets up file system links to the raw log files in the log subdirectory.

The raw log file is configured.

How You Prepare Your Installation for General Use

After Ingres is installed, you must complete additional tasks so that users can access and use the new installation.

To prepare Ingres for general use, you must complete all or some of these tasks:

- Enable recovery of your master database.

To help recover your master database (iibdadb) if it becomes corrupted, make sure that iibdadb has been checkpointed and journaling enabled (the default). For details, see the *Database Administrator Guide*.

- Add an automatic startup command (see page 62).

- Authorize users to start and stop servers.

If you plan to have users other than the Ingres system administrator start and stop the Ingres servers, you must edit the config.dat file. For details, see the *System Administrator Guide*.

- Allow access on systems using shadow passwords (see page 63).

- Allow users to access tools and databases (see page 63).

- Create or upgrade databases.

For each new installation, someone must create the user databases. To create a database, use the createdb command (see the *Command Reference Guide*) or Visual DBA, if available (see the *Database Administrator Guide*). You do not need to create the iibdadb master database because it is created during installation.

Note: Check the Readme file for any additional tasks necessary for your platform.

Automatic Startup Command

You can have Ingres start up and shut down automatically. To add an automatic startup command, you must know the startup mechanism your environment uses. See the administration manual for your UNIX environment, or ask your system administrator to assist.

Typically, UNIX startup scripts are organized either in directories by run-level, or in startups scripts in /etc.

Note: For additions or variations necessary for your platform, see the Readme file.

If your environment uses the "directory-by-run-level" method, we recommend that you sequence your Ingres script so that it starts late in the startup sequence, and shuts down early in the shutdown sequence.

If your environment uses one or a few startup scripts, edit the rc.local script. Look for a shell function called localrc, or simply add the Ingres startup near the end.

When writing the Ingres startup script, make sure that you set all necessary shell environment variables, and run the ingstart command as installation owner. At a minimum, you must set II_SYSTEM and PATH. In most UNIX environments, you must also set the shared library path (LD_LIBRARY_PATH, LD_LIBRARY_PATH_64, LIBPATH, SHLIB_PATH, or SH_LIB_PATH).

For example:

```
II_SYSTEM=/inghome; export II_SYSTEM

PATH=$PATH:$II_SYSTEM/ingres/bin:$II_SYSTEM/ingres/utility; export PATH

LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$II_SYSTEM/ingres/lib
export LD_LIBRARY_PATH

su ingres -c "ingstart"
```

If shared libraries are not supported on your operating system, there is no need to set the shared library path variable.

Depending on your UNIX environment, you may want to redirect the output of the ingstart command to a file or to /dev/console.

You must add the appropriate commands to the system startup file on each machine running a DBMS Server or client.

Allow Access on Systems Using Shadow Passwords

If your operating system has shadow passwords and you are not using the Ingres installation password authorization, you must install the password validation program to allow access to the networked DBMS Server.

To install the password validation program

1. Log in as root.
2. Run `$II_SYSTEM/ingres/bin/mkvalidpw`.

The `mkvalidpw` script installs the password authorization program used by the DBMS Server.

How You Establish User Access to Tools and Databases

The install process identifies only the owner of the system administrator account to your installation to permit authorized access to the databases.

To enable users to access tools and databases, the system administrator must do the following:

- Edit the user login files to facilitate user access to the tools needed to query the databases.
- Use the `accessdb` command or create user statement to authorize users to access specific databases.

For more information, see the *System Administrator Guide*.

Edit User Login File to Facilitate User Access to Tools

To facilitate user access to Ingres tools when they log in to the system, add the following access commands to the users' login files, where *installation_location* is the storage location for your installation's system files (executables).

For C shell, add the following command to each user's `“.cshrc”` file:

```
% setenv II_SYSTEM installation_location
% set path=($II_SYSTEM/ingres/bin $path)
```

For Bourne shell, add the following command to each user's `“.profile”` file:

```
$ II_SYSTEM=installation_location; export II_SYSTEM
$ PATH=$II_SYSTEM/ingres/bin:$PATH; export PATH
```

Edit User Login File to Set Up Shared Library Paths

To support shared libraries on your operating system, include the following command in each user's path. For the name of the library variable (*lib_variable*) for your platform—for example, LD_LIBRARY_PATH, LD_LIBRARY_PATH_64, LIBPATH, SHLIB_PATH, or SH_LIB_PATH—see the Readme.

For C shell:

```
% setenv lib_variable  
/lib:$II_SYSTEM/ingres/lib:$lib_variable
```

For Bourne shell:

```
$ lib_variable=/lib:$II_SYSTEM/ingres/lib: $lib_variable  
$ export lib_variable
```

View Contents of Your Current Installation

After you have completed the install process and started your installation, you can use the install utility with your current installation.

To view the contents of your current installation

1. Log in to your system through the installation owner account.
2. Change your active directory to II_SYSTEM/ingres:

```
% cd $II_SYSTEM/ingres
```

3. Enter the following command at the operating system prompt:

```
install/ingbuild
```

The initial screen of the install utility appears, with the following menu options:

```
CustomInstall PackageInstall Current Help Quit
```

Note: The Current option appears only if products are installed.

4. Choose Current.

The Currently Installed Components screen appears.

Component	Version	Size	Ready?
Embedded SQL Precompilers	II 2.5/0006 (su4.us5/00)	28K	Yes
INGRES 6.x Compatible Message Files	II 2.5/0006 (su4.us5/00)	4M	Yes
Ingres Intelligent DBMS	II 2.5/0006 (su4.us5/00)	84M	Yes
Ingres DTP for Tuxedo	II 2.5/0006 (su4.us5/00)	18M	Yes
Ingres C2 Security Auditing	II 2.5/0006 (su4.us5/00)	768K	Yes
Ingres Enhanced Security	II 2.5/0006 (su4.us5/00)	905K	Yes
Ingres Internet Commerce Enabled	II 2.5/0006 (su4.us5/00)	56M	Yes
Ingres Networking	II 2.5/0006 (su4.us5/00)	41M	Yes
Ingres Object Management	II 2.5/0006 (su4.us5/00)	11M	Yes
Ingres Protocol Bridge	II 2.5/0006 (su4.us5/00)	39M	Yes
Ingres Replicator	II 2.5/0006 (su4.us5/00)	2M	Yes
Ingres Spatial Object Library	II 2.5/0006 (su4.us5/00)	11M	Yes
Ingres Star Distributed DBMS	II 2.5/0006 (su4.us5/00)	5M	Yes
Ingres Visual Management Tools	II 2.5/0006 (su4.us5/00)	90M	Yes
Query and Reporting Runtime	II 2.5/0006 (su4.us5/00)	34M	Yes

All Ingres components that are installed are listed.

Currently Installed Components Screen

The Currently Installed Components screen of the Install utility lets you perform various functions on your current installation, including the following:

- View the contents of your installation
- Verify the components you installed
- Add or remove components from your installation
- Run the setup program for components that were not set up during installation

The Currently Installed Components screen contains the following items:

Ready? column

Indicates whether the component has been set up (Yes or No).

VerifyAll function

Verifies checksums and sizes for every file in all components. Use this function to troubleshoot problems that occurred during the installation procedure, such as a corrupted disk. Perform the VerifyAll operation before you contact Ingres Technical Support to report installation problems.

GetInfo function

Displays the description of the component indicated by the cursor line.

Remove function

Deletes the component indicated by the cursor line.

All files for the selected component are deleted. Files that were created by the component (for example, application source code files) are not deleted.

Note: You are not necessarily required to shut down your installation to remove a component, but you must ensure that no one is using an executable you intend to remove. For example, you do not have to shut down your installation to remove Ingres tools, if they are not in use, but you do have to shut down your installation to remove the Ingres DBMS.

SetupAll function

Sets up all components (conditional menu option).

Setup function

Sets up the component indicated by the cursor line (conditional menu option).

How You Add Components to an Installation

You can add components to an Ingres installation at any time.

Note: To perform this process, you must have the necessary operating system and Ingres privileges required of a system administrator or have access to the system administrator account.

To add products to an Ingres installation, follow this process:

1. Complete the Installation Worksheet by filling in values for any parameters that are required for the additional products you are installing.

Note: Leave the following as they are currently configured: Existing directories, environment variables II_CHARSET, II_CHECKPOINT, II_DATABASE, II_DUMP, II_INSTALLATION, II_JOURNAL, II_SYSTEM, II_WORK, and the log_file configuration parameter.

Important! You cannot change the character set from its current setting (II_CHARSET) at any time without risking the corruption of your data.

2. Check your system resources.
3. Shut down your existing installation with the ingstop utility or Ingres Visual Manager (if available).
4. Follow the process for installing Ingres, as appropriate.

Note: Any existing Ingres Net connection and user authorization definitions remain in effect.

Chapter 4: Installing Ingres on OpenVMS

This chapter describes how to install, start, and prepare Ingres on OpenVMS. It provides detailed steps for first-time installers and a “quick install” procedure for experienced installers.

How You Prepare for Installation on OpenVMS

You should thoroughly understand the issues regarding system resources, storage locations, and other configuration parameters before installing Ingres. If you are not sure, have someone more knowledgeable in these areas perform the installation planning.

Before installing Ingres on OpenVMS, do the following:

- Know what comprises an Ingres installation.
- Know how you want to configure your installation.
- Know which Ingres products you want to install.
- Decide on locations for the various files and define concealed logicals for them.
- Complete the OpenVMS Installation Worksheet, provided as an appendix in this guide.
- Verify system requirements.
- Decide on the user name and User Identification Code (UIC) for your system administrator account.
- Choose installation method (Standard Install or Express Install).

An Ingres Installation

An Ingres installation consists of a set of product components that share a unique system-file location, ownership, and installation code.

You can configure an installation in many ways, depending on the products you install and the parameters you set. For example, you can configure an installation as a stand-alone system or as a client that accesses databases on a remote DBMS Server installation. A network can contain many different types of installations.

Major Configuration Options

Initially, you can configure your installation as one of the following major types. Later, you can install other products or modify parameter settings to add more capabilities to your installation. For example, you can add networking capabilities to a stand-alone installation that is connected to a network. Or you can add client capabilities to an installation that you initially configured as a networked DBMS Server.

The major configuration options are as follows:

Stand-alone DBMS Server

Provides only local access to local databases. This installation includes the Name Server, DBMS Server, and its own set of tools.

Required products: DBMS Server, tools

Cluster

Runs on one or more nodes in a cluster environment, which provides access to local databases from any of the nodes running Ingres.

This installation includes the Name Server, DBMS Server, and its own set of Ingres tools. It does not require a Communications Server.

Local databases, transaction log files, and other Ingres areas must be located on commonly accessible cluster devices.

If an Ingres node in the cluster installation crashes, any incomplete transactions on the failed node are recovered by Ingres processes.

Required products: DBMS Server, Ingres tools

Networked DBMS Server

Allows remote clients to access its databases through a network. (If tools are installed, local users also can access its databases.)

This installation includes the Name Server, DBMS Server, Communications Server, Data Access Server, ODBC driver, and JDBC driver.

By installing Ingres tools and then modifying the Ingres Net connection data, you can add outgoing client capabilities to a networked DBMS Server installation. Doing so enables it to act both as a client of a remote DBMS Server and as a DBMS Server to its own remote clients.

Required products: DBMS Server, Ingres Net, ODBC driver, JDBC driver, Ingres tools (optional, but required for local access to local databases)

Networked DBMS Server with Ingres Distributed Option

Allows access to multiple databases—local and remote, Ingres and non-Ingres—simultaneously. This installation includes Ingres Distributed Option, Name Server, DBMS Server, Communications Server, Data Access Server, ODBC driver, and JDBC driver. It may also contain Ingres tools.

Required products: DBMS Server, Ingres Net, ODBC driver, JDBC driver, Ingres Distributed Option, Ingres tools (optional)

Client

Has its own set of Ingres tools and accesses databases on a networked DBMS Server installation on a remote node. This installation includes the Name Server, Communications Server, Data Access Server, ODBC driver, JDBC driver, and Ingres tools. It does not contain the DBMS Server.

You can configure a networked DBMS Server installation as a client of another DBMS Server on a remote node. To do so, install Ingres tools on the DBMS Server, and then add client capabilities by modifying the Ingres Net connection data.

You can set up a client in a different environment to access an Ingres database in your current environment. For example, a client in a Windows environment can access a database in a Linux environment. For more information, see the *Connectivity Guide*.

Required products: Ingres Net, ODBC driver, JDBC driver, Ingres tools

Multiple Instances on One Node

You can have more than one installation on the same stand-alone computer or network node. Each installation on that computer or node must have a unique installation code.

A single node can contain one system-level DBMS Server or client installation and many group-level installations. The system-level installation is the “main” installation, which may be accessed by all authorized users. Each group-level installation will be the default for the members of a given group with a particular user identification code (UIC). Non-group members may use such an installation by running a script that is provided for that purpose.

Important! Assigning multiple instances to the same group UIC corrupts data and the logging and locking system.

System-level and group-level installations use different logical name tables to store Ingres location logicals (for example, II_DATABASE). In a system-level installation, these logicals are set at the system level and are stored in the LNM\$SYSTEM table. In a group-level installation, logicals are set at the group level and are stored in the appropriate LNM\$GROUP table. For instructions on how individual users can switch between system-level and group-level installations, see the *System Administrator Guide*.

The Ingres system administrator must maintain and keep separate any multiple instances on the same node. To help you keep track of these instances, the “ii_installs.com” script and the installation history log file (see page 95) “ingres_installations.dat,” are provided in the distribution.

Complete the Installation Worksheet

Before installing Ingres, you should record file locations and values for other installation parameters on the installation worksheet (provided as an appendix in this guide). These entries will serve as ready responses to the installation program prompts.

To complete the worksheet

1. Make a copy of the blank Installation Worksheet for each installation you intend to create.
2. Fill in values for the required parameters.

Note: In a cluster installation, a few of the worksheet values must be supplied for each node.

3. Keep the completed worksheet for future reference.

File Locations

Before installing Ingres, you must decide on locations for the Ingres system (executable) files, databases, transaction log, checkpoint, journal, dump, and temporary work files.

Fill in these locations on your Installation Worksheet.

The disk configuration diagrams that follow can help you to decide on file locations.

For more information about file locations, see the appendix "General Reference."

Definition of Logicals

You must define logicals to point to a disk and optional directory location where the various files will be stored. Your Installation Worksheet lists the locations you must specify.

When specifying file locations other than II_SYSTEM, you must use a defined *concealed logical name* rather than the actual disk or directory specification. A *concealed logical name* is a name that you define to represent a particular directory specification. The install program stores the concealed logical name in the appropriate Ingres logical (for example, in II_DATABASE). It then uses your definition of the concealed logical to ascertain the actual location in which it will create the appropriate directory tree. This makes it easier to change locations later, if necessary. For details, see the *System Administrator Guide*.

The II_SYSTEM logical should be defined as either a concealed logical or as a device, if that device is a concealed logical. There is no advantage to using a concealed logical for II_SYSTEM, because the install program stores only the translated real device and optional directory specification in the II_SYSTEM logical. For more information, see the appendix "General Reference."

You must define any logicals other than II_SYSTEM that you use as both "rooted" and "concealed" at the system or group level as appropriate for your installation. A "rooted" logical can be used directly as if it were a device name. A "concealed" logical is one that is not translated any further; that is, the definition is concealed from programs that use them.

Define II_SYSTEM as a Logical

To define II_SYSTEM as a logical, enter one of the following commands at the operating system prompt, as appropriate:

- Group-level installation (while logged into an account in the appropriate group and the GRPNAM privileges):

```
$ define/group/exec/translation=concealed -  
  II_SYSTEM disk:[dir.]
```

- System-level installation:

```
$ define/system/exec/translation=concealed -  
  II_SYSTEM disk:[dir.]
```

Define a Concealed, Rooted Logical

To define a concealed, rooted logical

1. Enter one of the following commands at the operating system prompt, as appropriate.

Group-level installation (while logged into an account in the appropriate group and the GRPNAM privileges):

```
$ define/group/exec/translation=concealed -  
  logicalname disk:[dir.]
```

System-level installation:

```
$ define/system/exec/translation=concealed -  
  logical name disk:[dir.]
```

where:

logicalname

Is the name you assign to the concealed logical representing the location for a particular set of files.

disk

Is the disk on which these files will reside.

dir

Is the directory specification, if appropriate, in which you want the install program to create the directory tree for storing the Ingres files.

2. Enter the logical name on your worksheet.

DBMS Server Disk Configurations

Your Ingres installation can use from one to four or more disks.

To avoid a single point of failure, we recommend *at least* a two-disk installation.

For any server configuration, you can set up an optional backup transaction log device on a separate disk from the primary transaction log. This setup enables recovery of unsaved, committed transactions if the primary transaction log device fails.

Four-Disk DBMS Server Configuration

A configuration with four or more disks provides the best performance and recovery options. For best performance, configure your system with the operating system on a separate disk and your Ingres files on three or more other disks, as follows:

Disk 1—Operating system files

Disk 2—Checkpoint, journal, and dump files

Disk 3—Product system files, and transaction log work files

Disk 4—Databases

If possible, put your backup transaction log on a separate disk from both your database and primary transaction log. Also, you can use more than one disk partition for your transaction log.

Three-Disk DBMS Server Configuration

The following three-disk configuration provides better performance and recovery than a two-disk system:

Disk 1—Operating system, checkpoint, journal, and dump files

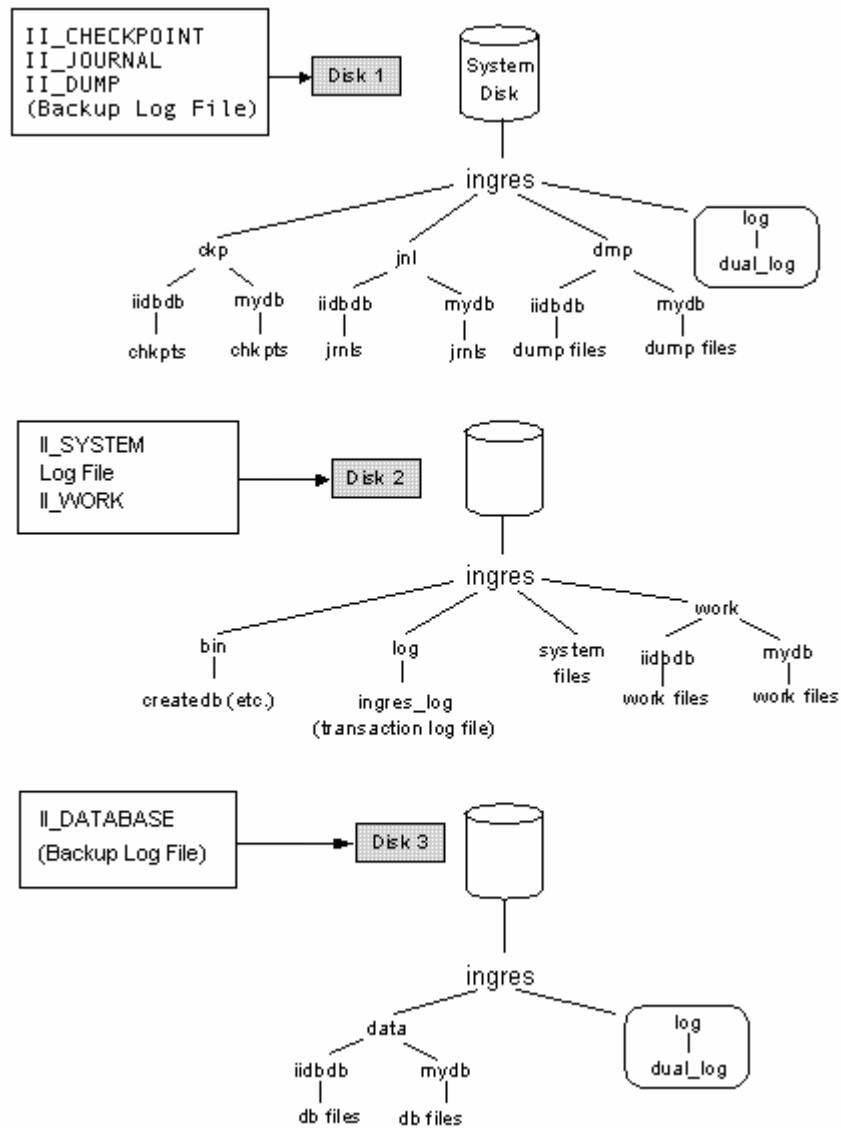
Disk 2—Product system files, and transaction log work files

Disk 3—Databases

Your backup transaction log can reside on either Disk 1 or Disk 3.

If Disk 3 fails, you can recover databases and committed transactions. If Disk 2 fails, you can recover your committed transactions if you have a backup transaction log; if you have no backup log, you will lose committed transactions that were not written to the database.

The following illustrates a sample three-disk DBMS Server configuration:



Two-Disk DBMS Server Configuration

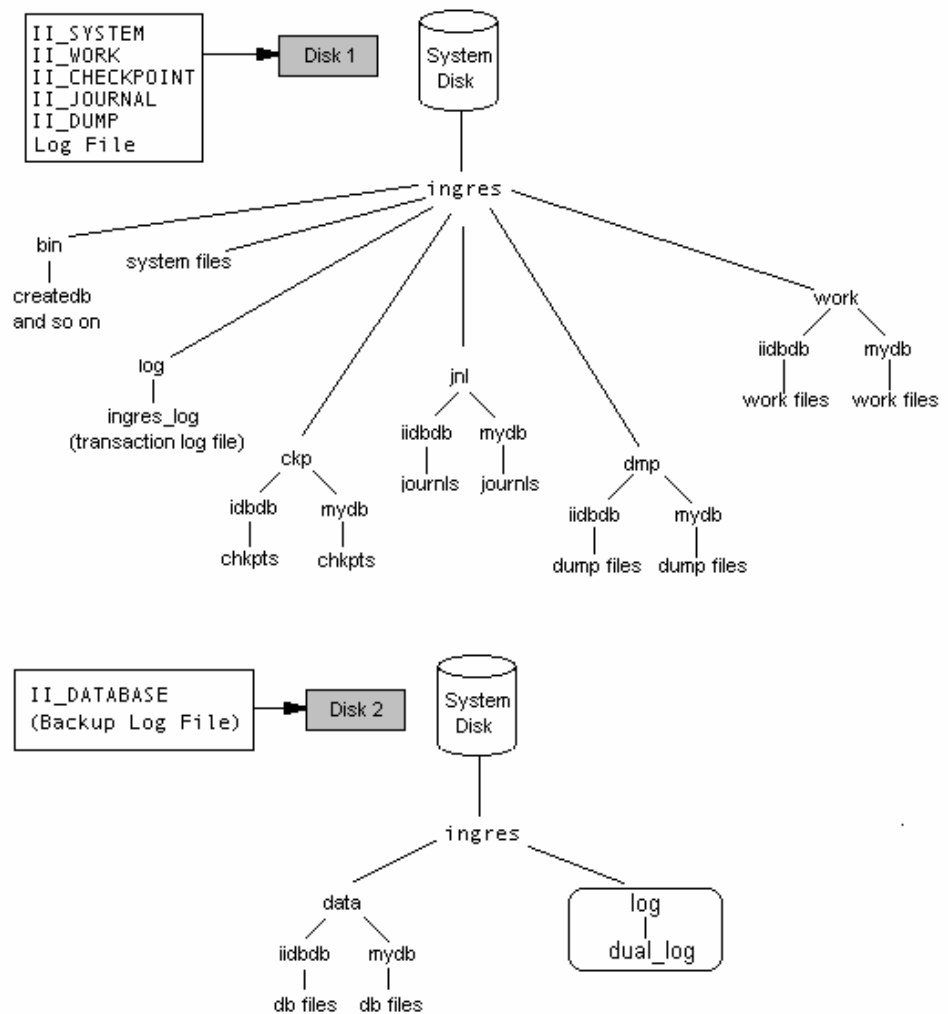
A two-disk system is the minimal recommended configuration:

Disk 1—All Ingres files except for those on Disk 2

Disk 2—Databases, optional backup transaction log file

If Disk 2 fails, you can recover databases and committed transactions. However, if Disk 1 fails and you do not have a secondary log device, you will lose unsaved, committed transactions.

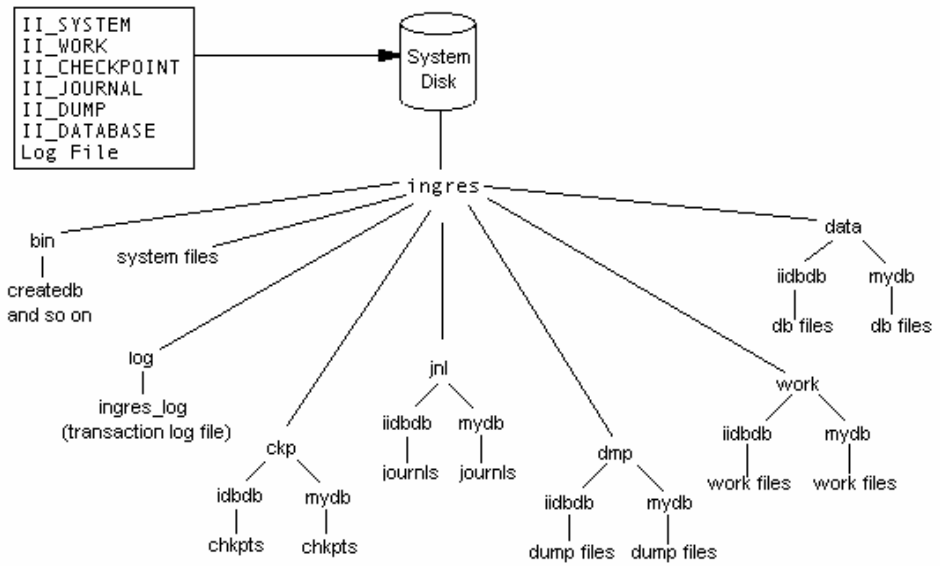
The following illustrates a sample two-disk DBMS Server configuration:



One-Disk DBMS Server Configuration

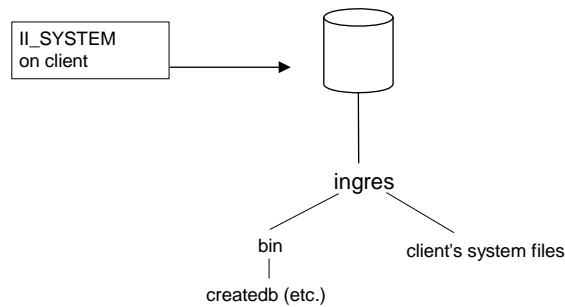
A single-disk system is a high-risk setup and not recommended. If the disk fails, you could lose all your data. On single-disk systems, you should checkpoint to magnetic tape.

The following illustrates a sample one-disk DBMS Server configuration:



Client-only Disk Configuration

In the Client configuration, the Ingres Net and Ingres tools system files reside on a single disk on the client installation. The Ingres DBMS Server executables reside on the networked DBMS Server installation.



Guidelines for VMS Cluster Configuration

Use the following guidelines when configuring a VMS cluster installation:

- All Ingres areas must be on commonly accessible cluster-mounted devices.
- Each node of a cluster installation must have its own transaction log file and backup transaction log file.
- All Ingres areas must be the same throughout the cluster, except for the areas for the transaction log file and backup transaction log file.
- Each node of a cluster installation can have its transaction log file and backup transaction log file in a separate location. However, the physical location of each node's transaction log files must be accessible to all nodes on the cluster that runs Ingres.

Installing and configuring Ingres in a VMS cluster environment is described in Ingres Cluster Solution for OpenVMS (see page 98).

System Resource Verification

Check your hardware and software against the requirements to determine if they are adequate to install and run Ingres and the tools. For requirements, see the readme and the appendix "System Requirements for OpenVMS." Requirements for your system may vary, depending on the products you install and the maximum number of users.

System Administrator Account

The system administrator account is a user account that is used for system management on each Ingres installation. The system administrator account owns the installation, and so the system administrator is often referred to as the installation owner.

This account must be created before installing the DBMS Server. You must install Ingres under this account because every DBMS system file requires ownership by this user.

Note: Use the system administrator account only for Ingres system management work. We recommend that you do not put non-Ingres files in this account.

Owner of the System Administrator Account

The install program automatically creates the system administrator account if you want, after you specify its user name and user identification code (UIC).

Note: When the install program creates the system administrator account, it automatically sets up the minimum recommended process resources and privileges. However, if you provide the user name or UIC of an existing account, you must ensure that the account has the appropriate resources and privileges.

Each separate installation must be owned by a *unique* OpenVMS account, even if the same person acts as system administrator for all installations. This applies to both system-level and group-level installations.

For a system-level installation, the recommended user name for the system administrator account is `ingres`; for group-level installations, it is `ingresxx`, where `xx` is the installation ID. These user names are suggested, but not required. You can substitute different names.

Note: The system administrator account must not be the “SYSTEM” account. A separate, privileged account is required.

UIC for an Installation

You can use any user identification code (UIC) for the account that owns a system-level installation as long as it is not used by any other Ingres installation. For a group-level installation, we recommend that you choose a group UIC that does not automatically confer system privileges. This means a UIC greater than the `SYSGEN` parameter, `MAXSYSGROUP`.

If you have more than one installation on a particular node, you must place these installations in separate group UICs. For example, if the UIC for the system-level installation is `[300,1]`, the UIC for a group installation on the same node can be `[400,1]`, but cannot be `[300,*]`.

The UIC determines the group logical name table for a group-level installation. The users whose group UIC has an installation will be allowed to access their group's installation by default. Scripts are provided to switch between installations, but users can become confused. Therefore, it is best to be sure the UIC for a given group installation does not include users who must access the system-level installation or a different group installation.

Component Installation Options

The installation program on OpenVMS asks you to select one of the following options to install Ingres components:

- **Package install**—This option lets you install one or more preconfigured packages.
- **Custom install**—This option lets you select each component individually.

Package Install

The Package Install option lets you choose from the following configuration packages:

Feature Name	Product Name
Ingres Stand-alone DBMS Server	standalone
Ingres Networked DBMS Server	dbmsnet
Ingres Networked DBMS Server with Star	dbmsstar
Ingres Networked Client	netclient
Ingres RMS Access	rmsgwpkg

Custom Install

A custom installation lets you install individual components to meet the specific needs of a site. Ingres generates internally the required files and dependencies for each component used in the installation.

The installation program lists all the available software, as follows:

Feature Name	Product
Bridge	Protocol Bridge Server
c2audit	C2 Security Auditing
Dbms	DBMS Server
Esq1	Embedded SQL Precompilers
Jdbc	JDBC Driver and JDBC Server
Net	Networking
Oldmsg	Ingres 6.x Compatible Message Files

Feature Name	Product
Ome	Object Management Extension
qr_run	Query and Reporting Runtime
qr_tools	Query and Reporting Tools
Rep	Replicator Option
Rms	Ingres RMS Access
Star	Distributed Option
Tm	Terminal Monitors
Vispro	VisionPro

Installation Methods

When installing Ingres on OpenVMS, you must choose between the following two installation methods:

- **Standard Install**—This option allows you to customize your installation. The standard installation procedure consists of two separate steps: installation and setup.
- **Express Install**—This option allows you to install and set up Ingres in one step. The express install procedure sets up your installation using default values for the configuration parameters.

This table compares the standard install and express install options:

Task	Standard Install	Express Install
Defining installation parameters	User-defined You can customize them to what you want.	Default
Completing the setup procedure	User-defined The setup procedure consists of a script that prompts you for values. You can perform the setup procedure whenever you wish.	Automatic You cannot affect the setup procedure.

Task	Standard Install	Express Install
Upgrading from a previous release	Optional prompt You can choose to upgrade your databases during the setup procedure.	Does not prompt Your installation is upgraded, but your databases are not. You must run upgradedb to upgrade your databases after the installation is complete.
Specifying file locations	User-defined You specify where you want files to be located, up to four or more different disks.	Automatic All files are put in the default directory of II_SYSTEM on one disk. Note: If all files are on one disk and the disk fails, you could lose data.
Specifying the installation code	User-defined You specify the installation code during the setup procedure.	Default The default value is used unless you define the installation code before starting the installation procedure. Note: If you have more than one installation on the same node, each must have a unique installation code.
Setting Ingres Net passwords	Optional prompt You can define Ingres Net passwords during the setup procedure.	Does not prompt You must define Ingres Net passwords after you complete the installation procedure.

How You Install and Configure Ingres (Experienced Installers)

If you are experienced at installing Ingres, you may want to follow this abbreviated process, which is a summary of the major steps for installing Ingres and tools.

The major steps to install Ingres on OpenVMS are as follows:

1. Define any logicals (see page 73) for Ingres locations.
2. Copy and complete the Installation Worksheet, provided as an appendix.
3. Ensure you have adequate system resources.
4. Shut down your existing installation, if running, with the `ingstop` utility.
5. Enter the following command from a fully privileged account to start the VMSINSTAL utility:

```
$ @sys$update:vmsinstal * distribution_medium
```

The *distribution_medium* is described in Install the Software (see page 87).

6. Respond to prompts on your screen to install the software, and to run IVP Setup programs, if necessary.

Note: On a cluster installation, the VMSINSTAL utility should be run on only one node, but the setup programs must be run on every node.

7. Start your installation by entering:

```
$ ingstart
```

8. Customize your installation further (see page 92), if appropriate.
9. Prepare your installation for other users (see page 93).

How You Install and Configure Ingres in an OpenVMS Environment

The process for installing and configuring Ingres products for the first time on a node is as follows:

1. (Optional) Define a default value for your terminal type prior to running the install program by defining the TERM_INGRES logical (see page 86).
2. Install the software (see page 87).

This step copies the contents of the distribution onto your system in the correct locations with the correct permissions. If using the Express Install, it also automatically sets required configuration parameters for installed components to default values.

3. Run the Installation Verification Procedure (IVP) setup programs (see page 89) (Standard Install only).

This step sets required configuration parameters for installed components.

Note: On a cluster installation, the setup programs must be run on every node. However, after completing the install and setup phase on just one node, you can start Ingres to test your installation. When you are satisfied with the results, you should shut down the installation and complete the setup programs on the other nodes.

4. Start Ingres, as described in Start Your Installation (see page 91).

This step starts Ingres on your system so the system administrator can access it.

5. Customize your installation (see page 92).

This step sets optional configuration parameters to allow Ingres to run as desired.

6. Prepare Ingres for general use (see page 93).

In this step, you perform additional tasks needed to prepare Ingres for its users, such as creating an automatic boot command, authorizing users, and creating databases.

Installation Procedure Considerations

The installation procedure transfers all pertinent files from the distribution medium to the II_SYSTEM location for your installation on this node.

Note: Before running the install program, make a complete backup of your system.

If a single installation is to have both DBMS Server and client capabilities, first install Ingres as a networked DBMS Server. Then, set up this installation's client capabilities with the netutil utility. For details, see the *Connectivity Guide*.

If you intend to create client installations that access a remote networked DBMS Server installation, install Ingres on your DBMS Server node first.

For faster data transfer during the installation process, you can copy the contents of the distribution medium to a storage directory as an intermediary step (for details, see your VMSINSTAL documentation). Then, specify the storage directory as the *distribution_medium* parameter.

Note: Upon completion, the install utility checks your *current* system resources—that is, the resources available during installation—to ensure that you can run Ingres as configured. You may want to perform the installation while running any non-Ingres programs that will typically run at the same time. By doing so, you can determine the resources that will be available to Ingres.

Define the TERM_INGRES Logical

The Ingres logical TERM_INGRES defines the type of terminal you are using. You can enter a value for TERM_INGRES in response to prompts during the install process, or optionally, prior to running the install program. For information on supported terminal types, see the *Database Administrator Guide*.

To set the TERM_INGRES logical before installation

Enter the following command at the operating system prompt:

```
$ define TERM_INGRES ingres_terminaltype
```

For example, the following command defines your terminal as a VT100f:

```
$ define TERM_INGRES vt100f
```

Install the Software

To install Ingres, you execute the VMSINSTALL utility. VMSINSTALL runs the installation and setup scripts, which prompt you for the appropriate directory locations and other necessary information. (For specific information about VMSINSTALL, see your OpenVMS documentation.)

See the appendix “OpenVMS Installation Example” for the screen displays of a complete installation and setup script for a sample installation.

Note: Upon completion, the install utility checks your *current* system resources—that is, the resources available during installation—to ensure that you can run Ingres as configured. You may want to perform the installation while running any non-Ingres programs that will typically run at the same time to determine the resources that will be available to Ingres.

To install the Ingres software on OpenVMS

1. At the operating system prompt, enter

```
$ @sys$update:vmsinstal * distribution_medium
```

The *distribution_medium* is the name of one of the following:

- A physical device, such as a CD-ROM drive, which holds the distribution medium
- A storage directory containing the files optionally transferred from the distribution medium

VMSINSTALL initializes the software environment, defines logical names and symbols, and makes validity checks. It also gives you an opportunity to cancel the install process, if you need to make a backup of your current system. If you choose to continue, all user-defined global and local OpenVMS symbols are deleted at that point.

The program then displays a description and important information about using the installation script.

2. Respond to the program prompts.

Some prompts display default values in brackets. To accept the default, press Return.

Enter the value for II_SYSTEM from your Installation Worksheet when you see the following prompt:

Location for this installation:

If the Ingres directory does not exist, the program creates it.

If any installed products require configuration, VMSINSTALL asks:

Do you want to run the configuration IVP following this installation [YES] ?

Enter **y** to run the Setup programs immediately after installation; otherwise, enter **n** to run the Setup programs later.

A final Installation Summary appears.

3. Confirm the installation summary.

VMSINSTAL installs the specified products and verifies that each product was transferred properly from the distribution medium. If you selected products that are dependent on other products, VMSINSTAL automatically installs the necessary products.

The installation finishes or starts executing the setup scripts.

The software is now installed on your system.

Setup Programs

The setup programs set configuration parameters that are required to run certain Ingres components. If you used the standard Install method, you must run the setup programs. (The Express Install method automatically sets up the configuration parameters.)

You can run the setup programs to configure the following installations:

- Stand-alone system
- Cluster system
- Networked DBMS Server installation
- Client installation

Not all components require setup, and many can be set up without user input. The setup programs for the Ingres DBMS Server and Ingres Net components require and prompt for user input. You should refer to your completed Installation Worksheet when running the setup programs.

Running the setup programs for most components takes only a few minutes; running the setup program for the DBMS Server takes significantly longer. The setup programs can be run independently, when desired.

If you are running the setup program for an upgrade installation, the programs prompt you only for those parameters you are allowed to change.

The setup programs create and update files in the installation directories, so you must have sufficient OpenVMS privileges to do so.

The II_SYSTEM logical must be defined in executive mode at either the group or system level. Check the current setting with the following command:

```
$ show logical/full II_SYSTEM
```

Details on setup program tasks are described in How the DBMS Server Setup Program Works (see page 141).

Run the Setup Programs

The Setup programs configure installed components.

The Ingres Installation Verification Procedure (IVP) runs the Setup programs automatically at the end of the VMSINSTAL step, if you respond yes to the following installation program prompt:

Do you want to run the configuration IVP following this installation [YES] ?

If you choose to postpone running the setup programs or need to run them on another node in an Ingres cluster installation, you can invoke each setup program individually.

The order in which you execute the Setup programs is important. For a networked server installation, run the Setup program for the DBMS Server before running Ingres Net Setup. Ingres Net can then use several of the values you specified for the DBMS Server. Run Distributed Option Setup last.

To run a setup program

1. Enter the appropriate command, as follows:

```
$ @II_SYSTEM:[ingres.utility]program_name
```

where *program_name* is the name of the setup program, as follows:

iisudbms

DBMS Server setup

iisuc2

C2 Security auditing

iisunet

Ingres Net setup

iisudas

Data Access Server setup

iisubr

Ingres Bridge setup

iisuabf

Applications-By-Forms setup

iisurep

Ingres Replicator Option setup

iisuodbc

ODBC Driver setup

iisujdbc

JDBC Server setup

iisustar

Ingres Distributed Option setup

iisurms

RMS Gateway setup

iisukerberos

Kerberos setup

The Setup program for each component displays a description of its purpose and any other important information you should know before setting up the software.

2. Respond to the program prompts.

If you are setting up Ingres for clusters, you must provide a unique cluster identification number, between 1 and 32, which identifies the current node.

When setting up required parameters, default values sometimes appear in brackets after the prompt, as in the following example:

```
How many concurrent users do you want to support? [32]
```

To accept a default value, press Return. Otherwise, enter an appropriate value from your Installation Worksheet and press Return.

If you do not upgrade all databases during setup, you can upgrade specific databases later, using the `upgradedb` command (which also runs the utility that upgrades the tools catalogs). For more information, see the *Migration Guide*.

When the Setup programs complete, you are returned to the operating system prompt. Your Ingres installation is now configured.

Start the Ingres Installation

After you have installed the software and set up the required configuration parameters for each component, you are ready to start your installation.

To start your installation on OpenVMS

1. Log on to your system through the system administrator account for your installation.

2. Enter the following command:

```
$ @II_SYSTEM: [ingres] ingsysdef.com
```

The symbols needed to start the installation are defined.

3. Shut down any components of your installation that are running by using the following command:

```
$ ingstop
```

The installation is stopped.

4. Enter the following command to start your installation:

```
$ ingstart
```

Ingstart checks that you have sufficient operating system resources to run the Ingres components; if not, it issues an error message and exits. If resources are sufficient, all servers are started.

How You Further Customize Your Installation

After Ingres is installed, configured, and started, you may need to perform the following additional tasks:

- Change default values for some configuration parameters to suit your particular needs or enhance performance.

The default configuration installed by the setup programs is suitable for moderate hardware (about 512 MB of memory) and a moderate number of users (about 32). You may need to change the size of the transaction log file or the number of concurrent users (`connect_limit`).

To change parameter settings, use the Configuration-By-Forms utility or the `ingsetenv` command.

Note: Some changes, such as to the logging system, should not be made while the DBMS Server is running. Changes made with Configuration-By-Forms while servers are running are not effective until you restart the servers.

- Set up virtual nodes, remote user authorizations, and connection data, as needed, for DBMS Server and client installations. Use the Net Management Utility (`netutil`).

If you installed Ingres Net for the first time and did not define the DBMS Server password on the server or client nodes, add authorization entries that enable clients to access databases on the DBMS Server node.

If you are upgrading an existing installation or adding Ingres Net to your Ingres installation, your existing `netutil` definitions remain in effect. For more information, see the *Connectivity Guide*.

- Add client capabilities to a networked DBMS Server by setting up the appropriate Ingres Net client parameters. For details, see the *Connectivity Guide*.

How You Prepare Your Installation for General Use

After Ingres is installed, you must complete additional tasks so that users can access and use the new installation:

To prepare Ingres for general use, you must complete all or some of these tasks:

- Enable recovery of Your master database.

To help recover your master database (iidbdb) if it becomes corrupted, make sure iidbdb has been checkpointed and that journaling has been enabled. This is the automatic default. For details, see the *Database Administrator Guide*.

- Add an automatic startup command (see page 94).

- Authorize users to start and stop servers.

If you plan to have users other than the Ingres system administrator start and stop the Ingres servers, you must edit the config.dat file. For details, see the *System Administrator Guide*.

- Allow users to access tools and databases (see page 94).

- Create or upgrade databases.

For each new installation, someone must create the user databases. To create a database, use the createdb command (see the *Command Reference Guide*). You do not need to create the iidbdb master database because it is created during installation.

- Maintain the installation history log file (see page 95).

Note: Check the Readme file for any additional tasks necessary for your platform.

For upgraded installations, the existing user login files are still valid. Although the new commands to start and stop Ingres are ingstart and ingstop, calls to iistartup in non-interactive mode in existing Ingres scripts are still valid.

How You Add an Automatic Startup Command

If you want your installation to start automatically whenever the system is rebooted, the operating system administrator must add the appropriate startup command to the system startup file.

Note: For any additions to this procedure that are necessary for your platform, see the Readme file.

To add an automatic startup command, follow these steps:

1. Log in to your system as the SYSTEM account.
2. Edit the system startup file. The install process places the appropriate startup command in the system startup file as a comment:

```
@SYS$STARTUP:INGRES_STARTUP.COM
```

Remove the comment status and delete any duplicate entries.

3. Edit the SYS\$STARTUP:INGRES_STARTUP.COM file to meet the needs of your environment.

How You Establish User Access to Tools and Databases

The install process identifies only the owner of the system administrator account to your installation to permit authorized access to the databases.

To enable users to access tools and databases, the system administrator must do the following:

- Edit the user login files to facilitate user access to the tools needed to query the databases.
- Use the `accessdb` command or create user statement to authorize users to access specific databases.
- Ensure that the appropriate logical names are “visible” to the users

Facilitate User Access to Tools

To facilitate user access to tools when they log in to the system, add the following access commands to the login.com file for the user:

For users, add:

```
@II_SYSTEM:[ingres]ingusrdef.com
```

For database administrators, add:

```
@II_SYSTEM:[ingres]ingdbadef.com
```

For the system administrator, add:

```
@II_SYSTEM:[ingres]ingsysdef.com
```

The commands in these files provide tools access to all users in a system-level installation and to all users with the appropriate group user identification code (UIC) in a group-level installation.

Installation History Log File

The install program records in the installation history log file each new installation as it occurs:

```
SYS$COMMON:[sysex]ingres_installations.dat
```

The installation history log file is placed in this location so that it can be as globally accessible as possible. VMSINSTAL will display its contents during installation to help avoid mistakes, so it is helpful to keep it accurate.

After completing the installation, save your Installation Worksheet as a permanent record of this configuration.

Edit the Installation History Log File

The system administrator can edit the installation history file to add data for an existing installation or to maintain data for your new installations.

To edit the installation history log file, use the following executable file provided with the distribution: `II_SYSTEM:[ingres.install]ii_installs.com`.

To run the `ii_installs.com` script

1. Log in as the system administrator and type the following at the system prompt:

```
$ @II_SYSTEM:[ingres.install]ii_installs
```

The `II_INSTALLS>` prompt appears.

2. Type the following:
`help`
3. Follow the instructions provided on your screen to view or add entries to this file.

Note: If editing the file, be sure to maintain the sequential order of wrapped rows.

How You Add Components to an Installation

You can add components to an Ingres installation at any time.

Note: To perform this process, you must have the necessary operating system and Ingres privileges required of a system administrator or have access to the system administrator account.

To add products to an Ingres installation, follow this process:

1. Complete the Installation Worksheet by filling in values for any parameters that are required for the additional products you are installing.

Note: Leave the following as they are currently configured: Existing directories, environment variables II_CHARSET, II_CHECKPOINT, II_DATABASE, II_DUMP, II_INSTALLATION, II_JOURNAL, II_SYSTEM, II_WORK, and the log_file configuration parameter.

Important! You cannot change the character set from its current setting (II_CHARSET) at any time without risking the corruption of your data.

2. Check your system resources.
3. Shut down your existing installation with the ingstop utility or Ingres Visual Manager (if available).
4. Follow the process for installing Ingres, as appropriate.

Note: Any existing Ingres Net connection and user authorization definitions remain in effect.

Ingres Cluster Solution for OpenVMS

The Ingres Cluster Solution is a variation of a typical Ingres installation in which Ingres runs simultaneously on multiple host machines to provide cooperative and transparent access to one or more databases.

Ingres Cluster is a full server installation, except that file locations must be storage locations accessible from each node that is part of the cluster. Once installed, you run the `iimkcluster` utility to convert the initial installation into one of the cluster members (nodes), and then run the `iisunode` utility to add more nodes.

Use of the Ingres Cluster Solution is incompatible with the following Ingres features:

- Row-level locking, except when accessing a database through a server class using "class node affinity"
- Update mode locks, except when accessing a database through a server class using "class node affinity"
- Two-phase commit (2PC)
- Replication
- C2 auditing of tables with long data types

On each node, make sure that Ingres and your applications perform as expected. Ingres internally handles some restrictions by converting some lock levels and lock modes to lower level locks and stronger lock modes, which may result in increased contention or deadlocks.

Requirements for the Ingres Cluster Solution on OpenVMS

The Ingres Cluster Solution has the following requirements:

- An Alpha VMS Cluster whose component machines are running VMS version 7.3-2 or above.
- DECNet available on all machines.
- Sufficient resources to run Ingres as a standard server installation on each machine.
- Sufficient storage accessible to all the machines in the cluster. The number and capacity of the shared storage devices should follow the guidelines specified for a standard Ingres server install.

How You Prepare to Install the Ingres Cluster Solution for OpenVMS

Before installing Ingres in a VMS Cluster environment, follow these steps:

1. Check the Ingres Technical Support web site for the latest cluster installation procedures and supported hardware and software. Download the required software.
2. Plan your storage location layout as described for a stand-alone Ingres installation, with the restriction that all your file locations—including data (II_DATABASE), transaction log (II_LOG_FILE, II_DUAL_LOG), checkpoint (II_CHECKPOINT), journal (II_JOURNAL), and dump (II_DUMP)—must reside on cluster mounted disks.

How You Install the Ingres Cluster Solution for OpenVMS

Follow these steps to install and configure Ingres in a VMS Cluster environment.

1. Install Ingres in a stand-alone configuration, using locations that reside on cluster mounted disks.

2. Verify that the stand-alone Ingres installation operates correctly.

Typically, it is easier to resolve any configuration issues at this stage because only one machine is in use.

3. When you are confident that the stand-alone Ingres is operating correctly, shut down the installation. As the user that owns the installation, execute the `iimkcluster` utility, as follows:

```
iimkcluster
```

The utility prompts you for a node number and a nickname.

Node numbers are unique integers in the range 1 through the maximum supported cluster members for your platform (currently 15). During a partial cluster failure, the surviving cluster member (node) with the lowest node number is responsible for recovering transactions on behalf of the failed nodes, so you should assign low numbers to the more powerful machines in the cluster.

The nickname is an optional simple alias, which you can use in any context in which you could specify a `nodename` parameter. The nickname appears in the error log instead of the machine name.

The `iimkcluster` utility renames the transaction logs and certain diagnostic log files (`iircp.log`, `iiacp.log`, and so on) by appending the host name of the machine on which the cluster member is running. Also created is a sub-directory in the `II_SYSTEM:[ingres.files.memory]` directory with the name of the host machine, and directory `II_SYSTEM:[ingres.admin.hostname]`, which is currently unused.

This step keeps entities that are normally operated upon by only one node separate from corresponding objects that will be created by the other nodes.

4. Restart Ingres. Confirm that all processes have started. Confirm the initial node is operational by performing a few sanity checks such as creating and destroying a scratch database.

You should also perform application testing to confirm that certain Ingres Cluster Solution restrictions, such as lack of support for row-level locking, will not impact the usability of your applications.

5. Shut down Ingres.

6. Run the `iisunode` utility on each node. As the user that owns the installation, enter the following:

```
iisunode
```

The utility prompts you for a unique node number and nickname. Once entered and confirmed, `iisunode` does the following:

- Adds the same directories for the new node as `iimkcluster` created for the initial node
 - Duplicates the configuration information from the initial node
 - Creates the transaction logs for this node
7. Start Ingres individually on each node, and verify correct operation.

How Client Applications Access an Ingres Cluster

Applications can access Ingres configured for Ingres Cluster Solution by using any of the following methods:

- Running directly on one of the cluster member machines
- Connecting directly to a specific cluster member using a `vnode` defined with the network address of the cluster member
- Selecting a connection to any available member of the cluster, or a subset thereof, by using a `vnode` defined with multiple network addresses

Class Node Affinity (CNA)

Ingres allows the creation of server classes that function as regular DBMS servers but can be configured for specialized situations. The server parameter `class_node_affinity`, if set for a server class, allows servers in this class to be started on only one node at a time.

The configuration name and server class name for the default CNA classes generated is `cn nn` , where nn is the node number, zero padded.

While `iimkcluster` and `iisunode` set up a separate CNA class for each node they are run on, these classes are not bound to the node they were defined on, but can be started on any node. In addition, any database (except `iidbdb`) that is connected to a server class using CNA cannot be opened by any other server class, including the default class.

The advantage of these restrictions is that because all operations on the database are known to be being performed on one node with pages resident in one cache, operations on the database do not require distributed locks, and the pages for the database do not need to participate in Distributed Multi-Cache Management (DMCM) protocols. For an installation servicing multiple databases, this allows you to increase efficiency by grouping your database operations by node, which significantly increases cache hit rates and decreases the latency of lock resolution and the overhead associated with DMCM. In addition, Row Level Locking and Update Mode Locks are automatically supported for databases serviced by CNA classes, instead of being silently converted to lower granularity locks and stronger lock modes.

Chapter 5: Understanding the Utilities

This chapter presents an overview of some of the Ingres graphical user interfaces (GUIs) for system management and database administration. It helps you to understand the available features and become familiar with the basics of working with these tools.

Note: You can use the GUI tools presented in this chapter on Windows, or on UNIX with the Main Win application by Microsoft. To see the UNIX platforms supported, see the Ingres Technical Support web site.

Ingres Visual Manager

The Ingres Visual Manager is an integrated GUI tool that provides a global view into your installation. It serves as a system “console” from which you can manage Ingres components and access other utilities. This utility also captures events that are occurring in the system, not only to alert the system administrator, but to act as a basis for creating rules that fix the errors.

In Ingres Visual Manager, you can quickly and easily:

- Start and stop the installation
- Monitor the status of the installation or individual servers
- View and configure system, user, and other types of parameters
- View the log files and event statistics for the installation or individual servers
- View and define error message alerts
- Invoke other visual tools, including the following:
 - Visual DBA
 - Configuration Manager
 - Network Utility
 - Visual SQL
 - Visual Performance Monitor
 - Import Assistant
 - Export Assistant
 - Journal Analyzer
 - Visual Configuration Differences Analyzer

System Summary Icon

On Windows, the Ingres system “summary” icon visually informs you of the state of the installation. You can tell immediately if Ingres is running—partially or completely—and whether any problems exist. The icon is located in the notification area of the taskbar.

The color of the icon indicates various states, as follows:

- **Green**—Instances of all Ingres components have been started, based on the chosen startup counts
- **Dark green**—Instances of all Ingres components have been started, based on the chosen startup counts, and additional instances of some components have been started manually
- **Half green and half red**—Instances of only some components have been started, based on the chosen startup counts
- **Red**—No instances of any components have been started

An exclamation point appears in the icon if an alert has arrived that the user has not yet acknowledged (by clicking on the message on the Logged Events page). The types of messages that generate an alert can be configured.

View System Information with Ingres Visual Manager

In Ingres Visual Manager, you can view and manage information related to an Ingres component.

To view system information

1. Click Start, Programs, Ingres, Ingres Visual Manager.

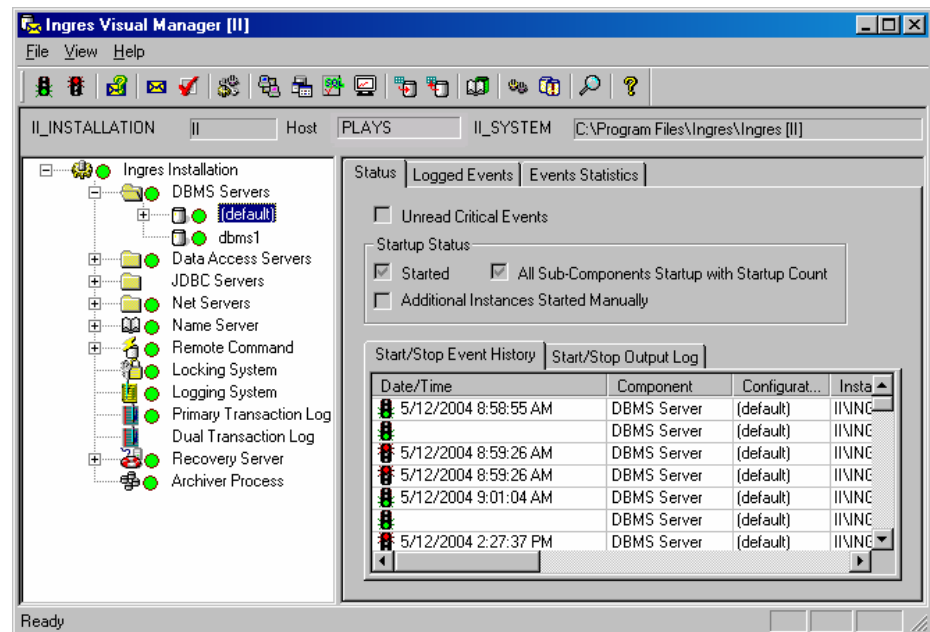
Note: On Windows, alternate methods of opening an Ingres Visual Manager window include double-clicking the system summary icon or right-clicking the icon and choosing Activate.

The Ingres Visual Manager window appears.

2. Select any of the component configuration sub-branches in the Ingres Visual Manager.

Information on the selected component is displayed in the right pane.

In the following example, the default configuration for the DBMS Servers component is selected:



- View information in the right pane, which contains three tabs:

Status

Shows the status of all instances that have been started for this configuration and the start/stop history of the configuration, in addition to other related information, such as the output of the last start or stop operation.

Logged Events

Lets you view and “acknowledge” events.

Event Statistics

Presents a graphical view of the events that have occurred.

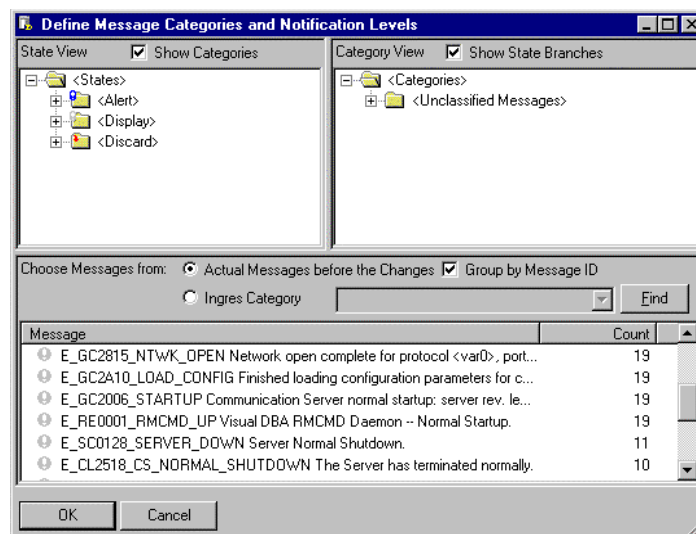
Define Message Categories and Notification Levels

In Ingres Visual Manager, you can control how various types of error log messages are handled. You can specify which messages should be discarded, displayed in Ingres Visual Manager, or displayed with a user alert.

To define message categories and notification levels

- Open Ingres Visual Manager, and choose File, Categories and Notification Levels.

The Define Message Categories and Notification Levels window is displayed.



2. Drag and drop a message from the lower pane to the desired state or category branch in one of the upper panes. You can define a state, a category, or both, for the message.

The message is classified according to the branches in which you dropped the message.

Visual DBA

Visual DBA is an intuitive, GUI-based database tool that enables you to manage servers and other database resources easily. In its flexible, interactive workspace you can:

- Connect to and work with multiple servers.
- Monitor your system, analyze performance, and perform system management tasks.
- Access and manipulate your databases and installations visually through powerful database administration utility windows.
- Create new databases, including distributed databases for use with Ingres Distributed Option.
- Install, view, and configure replication objects to be used with Ingres Replicator Option.
- Create and manage users, groups, profiles, and roles.

Navigational Tree Structure in Visual DBA

In Visual DBA, tree-like structures are used to delineate virtual node and server information, database objects and their relationships, and performance data in Multiple Document Interface (MDI) windows. For example, the Database Object Manager allows you to select the branch for the appropriate database object and then create, alter, drop, or assign privileges to it. You can even customize the tree structure of this window. Moreover, you can open and simultaneously work with multiple databases, servers, or both, in multiple windows.

Database Administration Tools in Visual DBA

In addition to the Database Object Manager, Visual DBA has several other tools that can be used to perform an array of database administration tasks required for your installation. For example, the SQL Test window helps you analyze the performance of your SQL queries. Furthermore, the Database Event Trace utility and the Performance Monitor enhance your ability to monitor database events and various types of performance data. For example, you can view and manage servers and sessions, as well as the locking and logging systems.

Also, you can manage distributed databases because Visual DBA offers connectivity to remote databases through Ingres Net and Enterprise Access gateways.

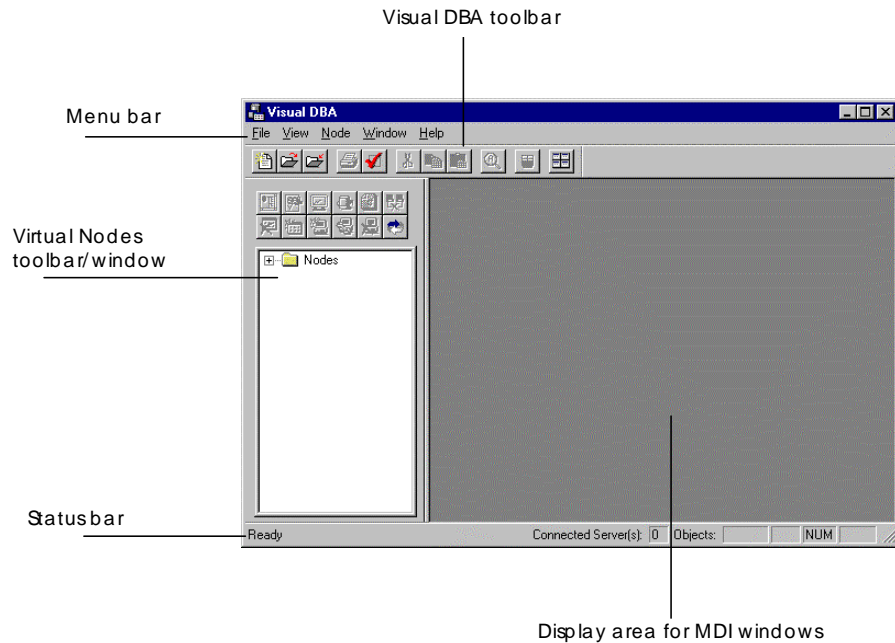
Visual DBA provides a host of other complementary tools to complete the database administration environment, including the capabilities to perform many of your routine database maintenance activities, along with system management and performance analysis. In addition, you can use Visual DBA to configure and propagate replication objects and manage your replication activities.

Start Visual DBA

To access Visual DBA, click Start on the taskbar, and then select Programs, Ingres, Ingres Visual DBA.

Visual DBA Workspace

The main areas in the Visual DBA workspace are as follows:



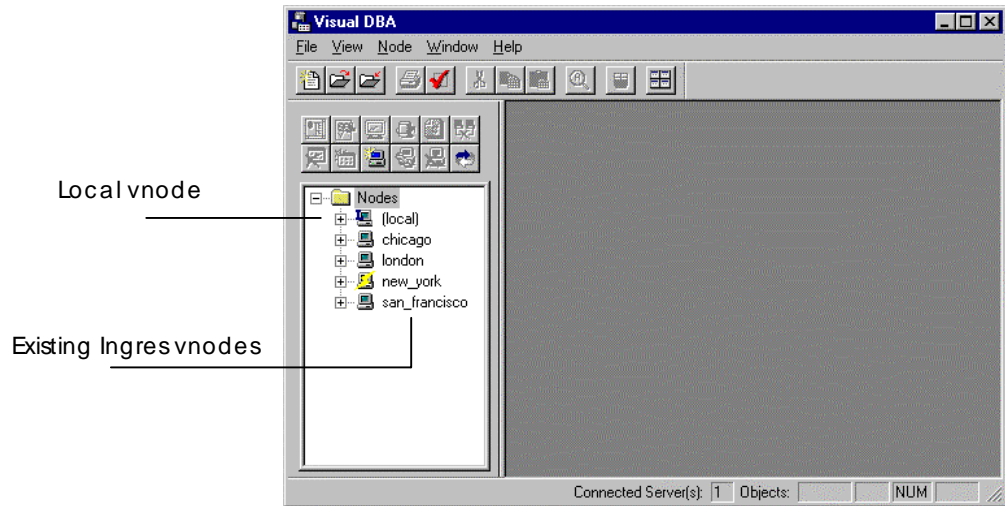
The right pane displays any MDI windows that you may open during your Visual DBA session.

The workspace can be customized. For example, you can hide the main application toolbar or the Virtual Nodes toolbar/window. Additionally, the toolbars in all windows are "dockable," meaning that they can be attached (or "docked") to any side of their parent windows by dragging the toolbar to the window border. A toolbar can also be "floated" in its own window by double-clicking it.

Virtual Nodes Window

Initially, the Virtual Nodes toolbar/window in Visual DBA displays your currently defined virtual nodes (vnodes) in a navigational tree structure.

When the *root* Nodes branch is expanded, the toolbar/window appears as follows:



The Virtual Nodes window has the following items:

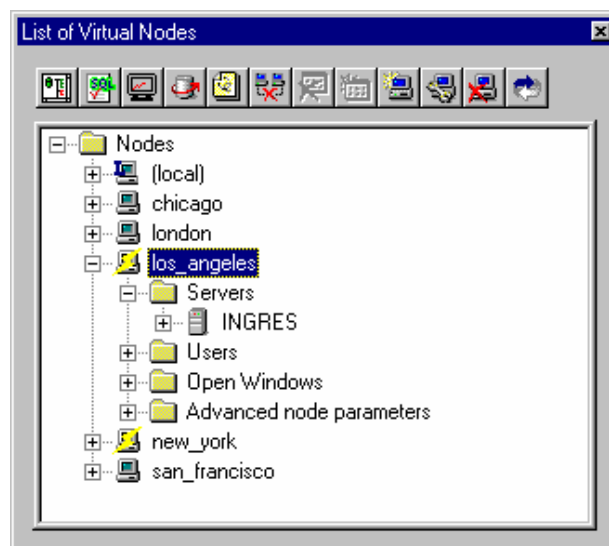
Local vnode

Is a special vnode named "(local)" that is present if you have a local database server running. If no local server is running, this special vnode is not available. You can connect to the local server by clicking this vnode.

Other vnodes

Are remote vnodes. Expand any of the node branches to view and manage information for that vnode, including servers, users, any open windows, and advanced vnode parameters.

In this example, the branch for the vnode, los_angeles, is expanded:



Note: Double-click on the Virtual Nodes toolbar/window to display it in its own MDI window, as shown in the previous example.

You can expand the Servers branch to view a list of its available servers and gateways for that vnode. The servers represent server classes found on that vnode. You can connect to a server by clicking a server node.


You can expand the Users branch to access a list of users on ingres server nodes. You can then establish a connection at the user level (under a different user name). You cannot connect under a different user name, however, if the default server class is not "ingres."

Note: To view, test, or manage virtual nodes outside of Visual DBA, you can use the Ingres Network Utility.

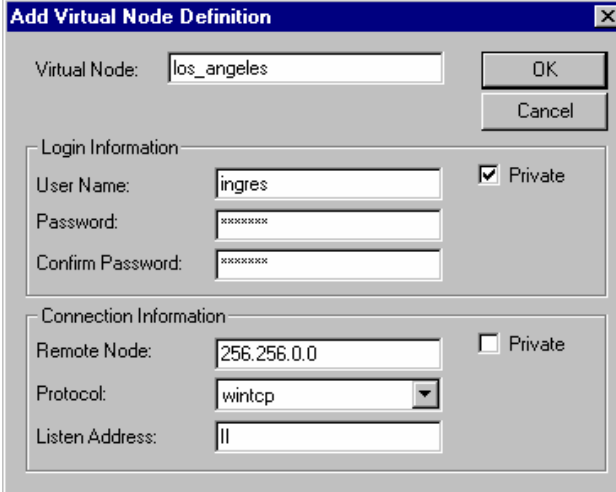
Add a Virtual Node

You can view, add, modify, test, or delete virtual node definitions from within the tree structure of the Virtual Node window.

To add a new virtual node

1. Select the Nodes branch on the Virtual Nodes toolbar/window, and click the Add toolbar button .

The Add Virtual Node Definition dialog appears.



The dialog box titled "Add Virtual Node Definition" contains the following fields and options:

- Virtual Node:** Text field containing "los_angeles".
- Login Information:**
 - User Name:** Text field containing "ingres".
 - Password:** Password field containing "*****".
 - Confirm Password:** Password field containing "*****".
 - Private
- Connection Information:**
 - Remote Node:** Text field containing "256.256.0.0".
 - Protocol:** Dropdown menu set to "wintcp".
 - Listen Address:** Text field containing "||".
 - Private

Buttons for "OK" and "Cancel" are located in the top right corner.

2. Enter a unique name in the Virtual Node field (for example, **los_angeles**), and other options for the vnode, including password, remote node name, networking protocol, and so on. Click OK.

For detailed information about each of these options, see [Creating a Vnode](#) in the Visual DBA online help.

The new vnode definition is saved and added to the Nodes branch on the Virtual Nodes toolbar/window.

Disconnect from a Virtual Node

Closing a window associated with a given vnode does not end communications with the servers on that vnode. Visual DBA continues to request data refreshes from the vnode until you disconnect from it.

To disconnect from a vnode

1. Select the branch of the virtual node (and server sub-branch, if desired) from which you want to disconnect, and click the Disconnect toolbar

button .

The Disconnect from Node dialog appears, displaying a list of the open windows associated with the chosen server.

2. Click OK.

The open windows are closed and you are disconnected from the server.

Database Object Manager

At the heart of Visual DBA, the Database Object Manager provides a convenient and organized way to view and manipulate the database information that is currently stored on a particular server.

To access the Database Object Manager

Select a virtual node, and click the Connect DOM toolbar button .

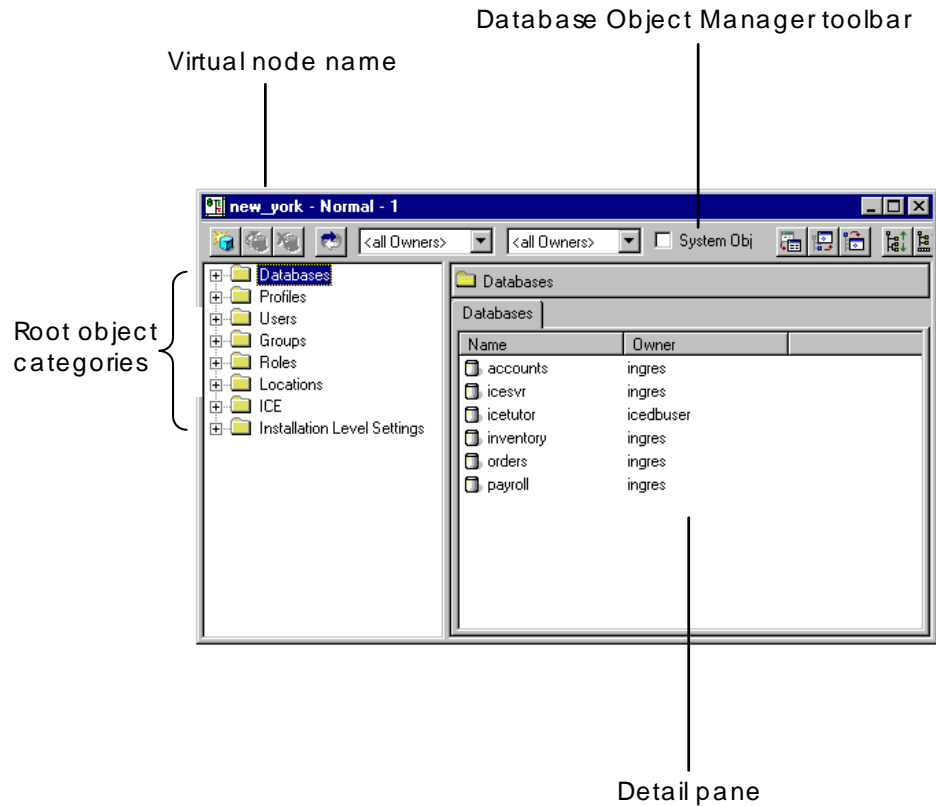
A Database Object Manager window is opened.

Database Object Manager Window

The Database Object Manager (DOM) window lets you manipulate database objects for a vnode.

You can have more than one DOM window open at the same time, with each window connected to the same or even different vnodes.

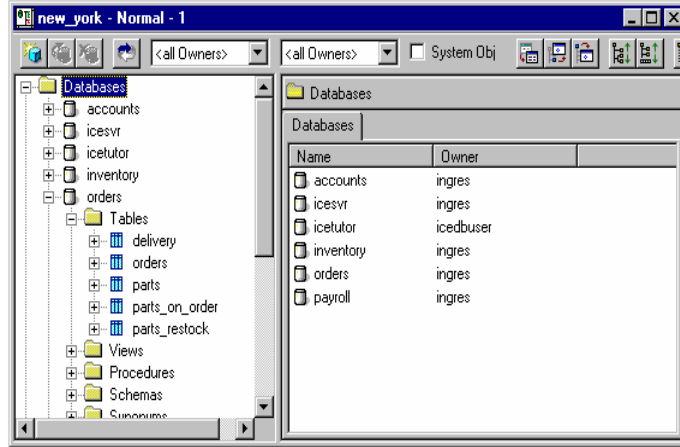
The main areas of the DOM window are as follows:



Root object categories

Is the initial view, representing categories of database objects. From this root level, you can select a category and drill down through lower-level, nested object category sub-branches to the information you need.

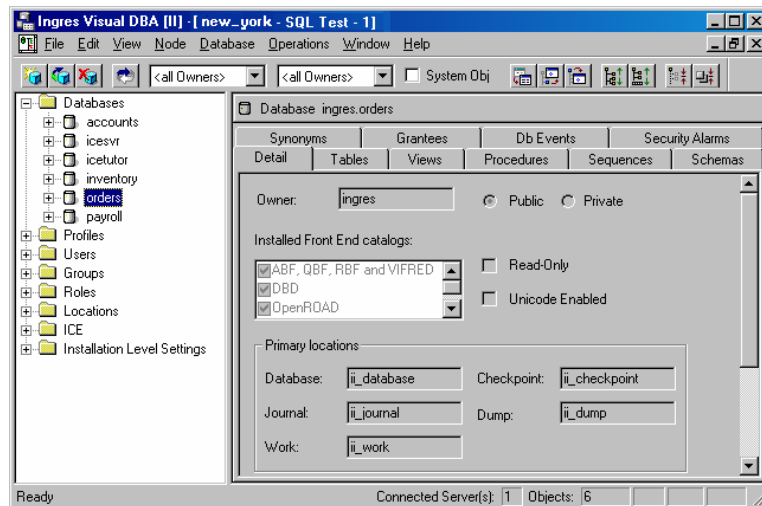
For example:



Detail pane

Displays detailed information about the database object selected in the object category branch (left pane). The information is organized by tabs. For example, to view information about the database object's tables, click the Tables tab.

In the following example, the orders database is selected and its properties displayed in the tab folder of the Detail pane:



Data Views in the DOM

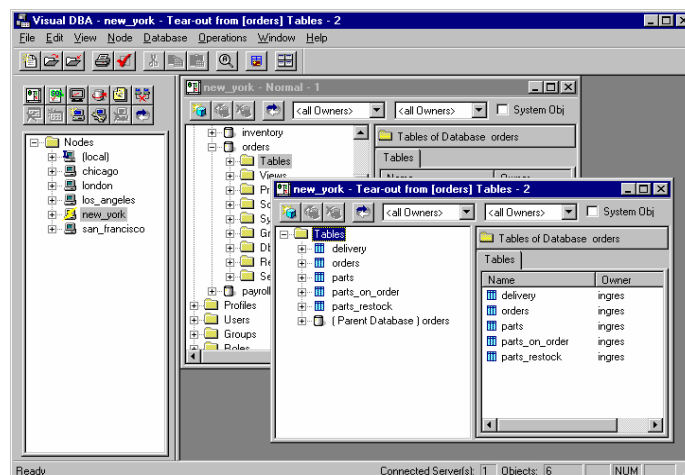
The Database Object Manager is a powerful and flexible tool, especially when you combine drill-down with any of these Visual DBA features:

- Restart from Position
- Tear Out
- Scratchpad

These features allow you to alter your view of the data by selecting *any* sub-branch and turning it into a root branch.

For instance, if you select a branch and then click the Tear Out toolbar button, you can create a new window while leaving the original window intact. The branch you select becomes the root branch in the new window and can be expanded to reveal all existing sub-branches.

In this example, the Tables sub-branch under the orders database branch is now the root branch in a Tear-out window:




Tip: You can also alter the navigational tree structure by setting database object filters or selecting the System Objects option. For detailed information about these features, see the Visual DBA online help.

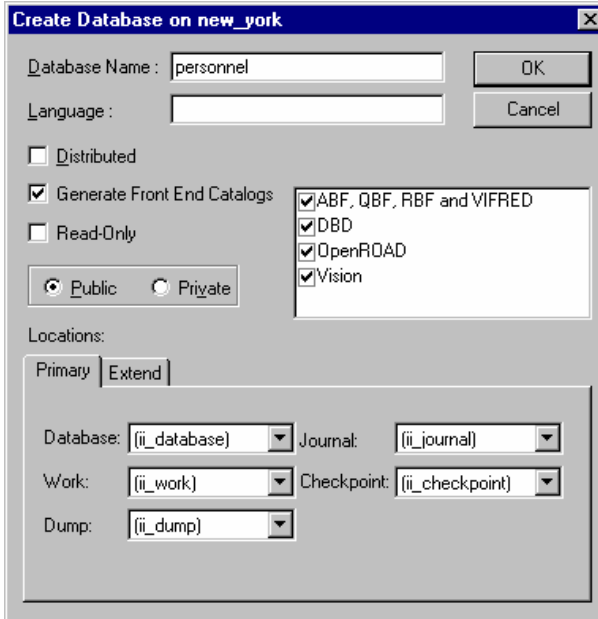
Create a Database

This procedure shows how to create a database using the default locations or alternate locations, and to create Ingres Distributed Option distributed databases.

To create a database

1. Select the Databases object category branch in the Database Object Manager window, and then click the Add Object toolbar button .

The Create Database dialog appears.



2. Fill in the necessary information:

Database Name

Defines the name of the database (for example, personnel).

Distributed

Creates a distributed database to be used with Ingres Distributed Option.

Primary tab

Lets you specify alternate locations for database files.

Click OK.

You are notified that the database has been created successfully.

Create a Base Table

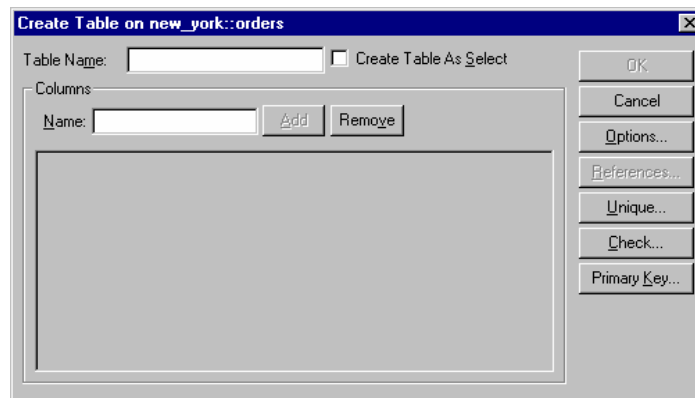
After you create a database, you can create its tables, indexes, and other database objects.

To create a base table

1. Expand the Databases object category branch in the Database Object Manager window, and then expand the branch of the database in which the table will be created.
2. Select the Tables object category branch and click the Add Object toolbar



The Create Table dialog appears:



3. Enter a unique, valid name for the table (for example, **customers**) in the Table Name field.

Note: You can create a table from another table by selecting the Create Table As Select check box. For detailed information about each option, see the Visual DBA online help.

4. Enter a column name in the Name edit control in the column layout box (for example, **cust_id**) and click Add.

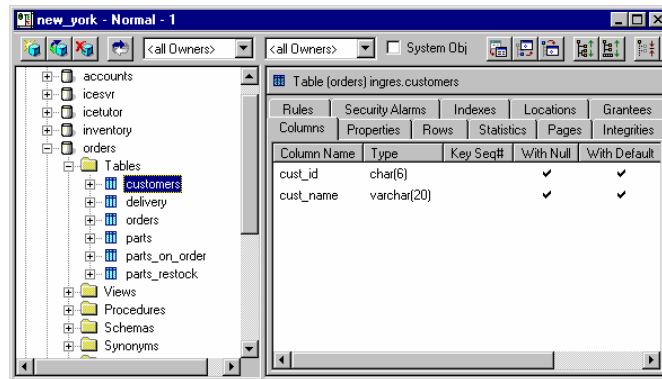
A column is added to the column layout box.

- Define the specifications of the column, such as data type, length, and primary key. For example:



- Repeat steps 4 and 5 for each column you want to add to the table (for example, add a **cust_name** column), and click OK.

The table is created and appears under the Tables object category branch, as shown in this example:



After a table and its columns are defined, you can then populate the table with data from a file. You can also create an index to improve query processing and define a view, or *virtual table*, to limit access to specific columns.

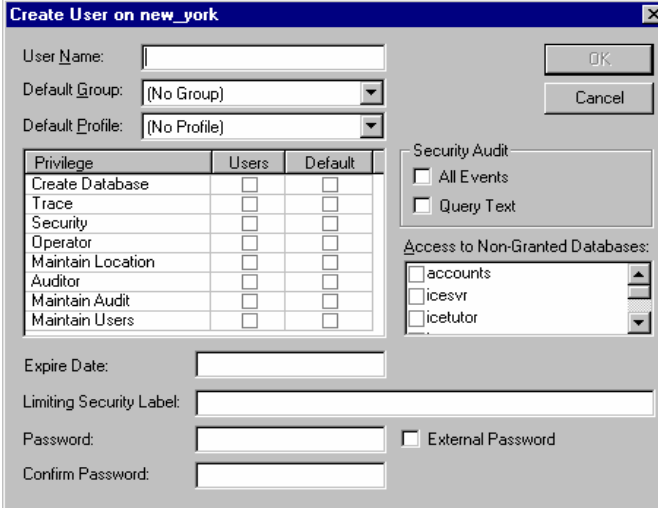
Create a New User Definition and Assign Privileges

You can use the DOM window to create user definitions and assign privileges (for example, the ability to create a database).

To create a new user definition and assign privileges to the user

1. Select the Users branch in the Database Object Manager window and click the Add Object toolbar button .

The Create User dialog appears:




Privilege	Users	Default
Create Database	<input type="checkbox"/>	<input type="checkbox"/>
Trace	<input type="checkbox"/>	<input type="checkbox"/>
Security	<input type="checkbox"/>	<input type="checkbox"/>
Operator	<input type="checkbox"/>	<input type="checkbox"/>
Maintain Location	<input type="checkbox"/>	<input type="checkbox"/>
Auditor	<input type="checkbox"/>	<input type="checkbox"/>
Maintain Audit	<input type="checkbox"/>	<input type="checkbox"/>
Maintain Users	<input type="checkbox"/>	<input type="checkbox"/>

2. Fill in the necessary information, and then click OK.

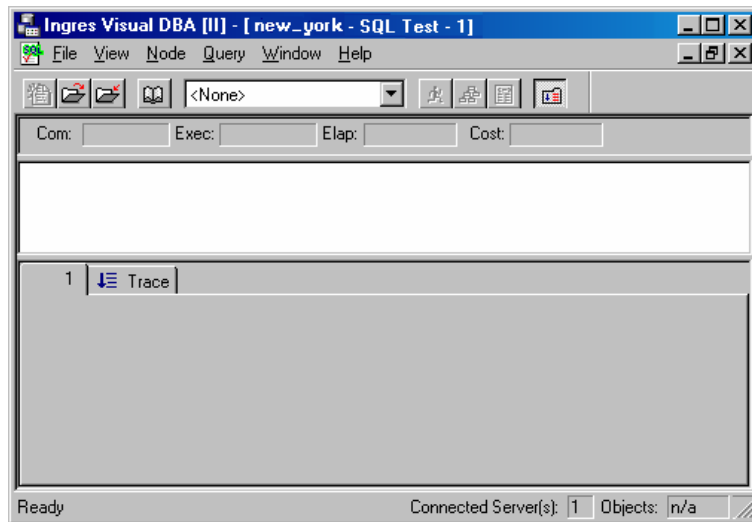
Note: For detailed information about each option, see the Visual DBA online help. Also, see the topic on granting and revoking database access to users.

The user is created and appears under the Users object category branch.

SQL Test Window

To access the SQL Test window, click the SQL Test toolbar button  in Visual DBA.

You can use the SQL Test window to test your SQL queries and subject them to an intensive evaluation. The SQL Test window presents all the facts to help you optimize database performance. When you run an SQL test, Visual DBA automatically displays the compile time, execution time, elapsed time, and the relative cost of the query operation.



The SQL Test window has the following items:

The database list box

Allows you to connect to a database.

Toolbar

Contains buttons for various functions, including:

- Clearing the query editor pane
- Opening, saving, and executing SQL queries
- Executing the Query Execution Plan (QEP) of an SQL statement
- Toggling the display of trace output
- Generating and saving results in XML format

Note: Use the SQL Assistant button to invoke the SQL Assistant, another Visual DBA tool, which can help you build an SQL query if you do not want to enter one manually.

Query statistics pane

Displays the compile time, execution time, elapsed time, and relative cost (number of I/O requests) of the query operation.

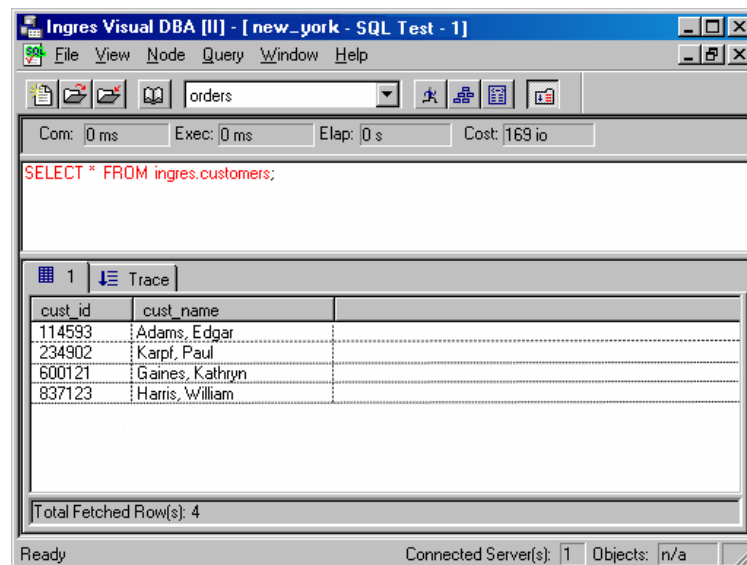
SQL query editor pane

Editor for entering SQL statements

Data browser pane

Displays the result of your query.

Here is an example SQL Test window after running a select statement query on the orders database:



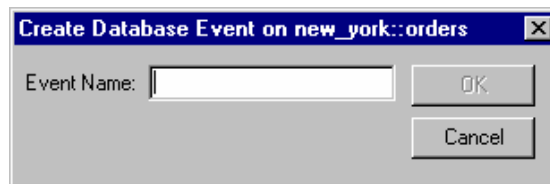
Create a Database Event

The Database Event feature in Visual DBA lets you monitor the database events that are raised on any database. This tool can be used for a variety of purposes—most importantly, for notifying you that selected “registered” database events have been raised.

To create a database event

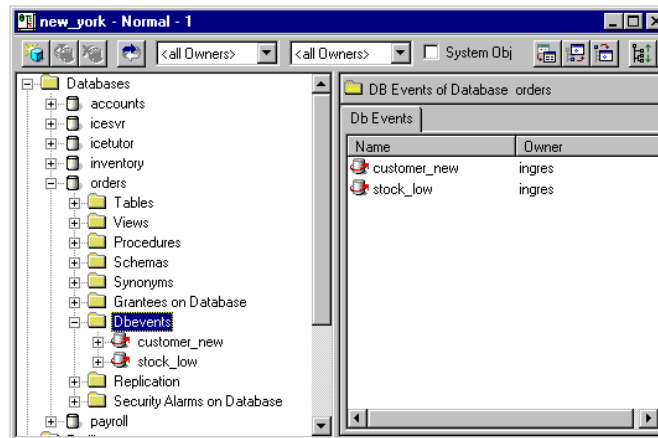
1. Expand the branch of the database (for example, orders), right-click its Dbevents branch, and choose Create.

The Create Database Event dialog appears:



2. Enter a database event name (for example, **stock_low**) in the Event Name text box and click OK.
3. Repeat steps 1–2 to create additional database events (for example, **customer_new**).


Your database events are added underneath the Dbevents branch:



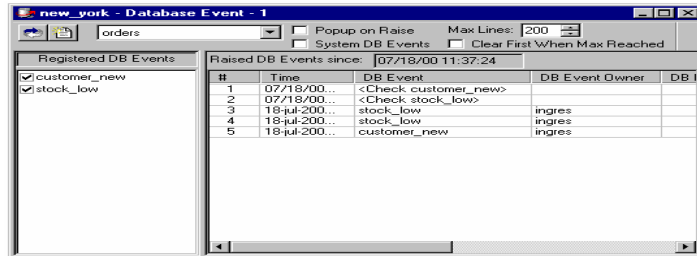
Trace a Database Event

After you have created database events and selected a virtual node, you can monitor these database events in the Database Events Trace window.

To trace a database event

1. Select a virtual node and click the DBEvent Trace toolbar button .

The Database Event Trace window appears:



2. Select a database from the drop-down list at the top, and in the left pane select the database events for which you want notification.

The Database Event Trace window contains two panes:

Registered DB Events

Lists the database events for the specified database. In this pane, you must select the events for which you want notification.

Raised DB Events

Displays a row of data for each database event that is raised. The data includes the name, date and time, owner, and database event text.

In this example, several database events from the orders database events are registered and selected. You can also see the rows of information that are displayed in the Database Event Trace window when these events are raised.

Exit Visual DBA

To exit Visual DBA, choose File, Exit.

All connections are terminated and the program is shut down.

VDBA Workspace Configuration

When exiting VDBA, if you have made changes to the environment since your last save operation, VDBA asks if you want to save your current environment as a VDBA CFG file on the drive and directory of your choice.

This feature is useful in saving you time during future sessions. After you save the current environment, you can open a workspace configuration file with the environment already set up to meet your needs. Additionally, you can save any number of workspace configurations.

Tip: You can double-click the configuration file (in a GUI environment) to start Visual DBA and open the saved environment automatically.

Chapter 6: Understanding the Interfaces

This chapter gives an overview of the tools that Ingres provides for interfacing with the database.

Ingres ODBC Driver

The Ingres ODBC driver is compliant with Microsoft Open Database Connectivity (ODBC) interface specifications. ODBC is a specification for an application programming interface (API) that enables applications to access multiple database management systems using the SQL language.

ODBC permits maximum interoperability—a single application can access many different database management systems. This enables an ODBC developer to develop, compile, and deploy an application without targeting a specific type of data source. Users can then add the database drivers that link the application to the database management systems of their choice.

The Ingres ODBC driver is installed during the installation process. It includes the Ingres ODBC Call-level Interface (CLI), which provides access to the ODBC application environment without the need to use a third-party driver manager. The Ingres ODBC driver is supported on all platforms on which Ingres runs.

For important information and a free download of the latest version of the Ingres ODBC driver, see the Ingres web site.

For more information on the Ingres ODBC driver, including supported functions and how to configure and connect to a data source, see the *Connectivity Guide*.

Ingres JDBC Driver

The Ingres JDBC product includes three components:

- Data Access Server (DAS)
- JDBC driver
- Information utility

The Ingres JDBC driver is a pure Java implementation of the JDBC 3.0 API released with the Sun Java SDK version 1.4. The driver supports application, applet, and serlet access to Ingres data sources through the Data Access Server.

The information utility, `JdbcInfo`, loads the Ingres JDBC driver and displays its internal release information.

For more information on the Ingres JDBC driver, see the *Connectivity Guide*.

Ingres .NET Data Provider

The Ingres .NET Data Provider is a .NET component that enables high-performance native .NET access to Ingres data sources, and delivers Ingres data to the Microsoft .NET Framework.

The Ingres .NET Data Provider offers:

- A series of .NET types to describe the user's data
- .NET provider classes to manipulate the data
- Connection pooling to efficiently manage data connections

Integration with Visual Studio .NET allows an application programmer to drag and drop the Ingres .NET Data Provider design component onto a design surface. Integration also allows the programmer to use wizards and editors to aid application development.

For more information on Ingres .NET Data Provider, see the *Connectivity Guide*.

Ingres OpenAPI

Ingres OpenAPI is a C programming language interface for accessing an Ingres database. It enables you to develop applications using a set of functions that are called directly with normal function-call facilities. This interface provides an alternative to embedded SQL, which requires a preprocessor in addition to a C compiler.

For more information, see the *OpenAPI User Guide*, which provides:

- Requirements for creating an Ingres OpenAPI application
- A description of the header files, library, and environment variables used by an Ingres OpenAPI application
- How to use the synchronous and asynchronous sample code included with the Ingres OpenAPI product

Embedded SQL

The term embedded SQL (ESQL) refers to SQL statements embedded in a host language such as C or Fortran. The ESQL statements include most interactive SQL statements, plus statements that fulfill the additional requirements of an embedded program.

All ESQL statements must be processed by the ESQL preprocessor, which converts the ESQL statements into host-language source-code statements. The resulting statements are calls to a runtime library that provides the interface to Ingres. After the program has been preprocessed, you must compile and link it according to the requirements of the host language.

For more information, including details about using ESQL with a particular host language and instructions on compiling and linking, see the *Embedded SQL Companion Guide*. You can also see the *SQL Reference Guide*, which describes ESQL independently of any host language.

Ingres Web Deployment Option

The Ingres Web Deployment Option provides the foundation for Internet-based electronic commerce. It enables a Web client to retrieve data from or update an Ingres database.

You can specify actions to perform in your Web application using special HTML variables defined by the Web Deployment Option. For example, there are variables to:

- Execute dynamic SQL statements.
- Run Ingres database procedures.
- Run Report-Writer reports.
- Run client applications.

A page generated by setting HTML variables can contain data from only a single SQL statement. When you need data from more than one statement, you can create Web Deployment Option Macro XML documents. A macro document contains one or more special tags that define an SQL statement to be executed. Macro XML allows you to create Web pages that include data from several database tables and provides many formatting options that control the way the data is presented to the Web client.

Additionally, the Web Deployment Option provides macro tag extensions for use with an XML-aware editor, so that adding XML elements to your documents is easier than ever. You can simply point and click to automatically generate macro syntax within your working environment. For more information, see the *Distributed Option User Guide*.

Application Development Tools

Ingres provides an extensive set of application development tools, which include:

- Vision
- Applications-By-Forms (ABF)
- Visual Forms Editor (VIFRED)
- Forms Runtime System (FRS)

For information on these tools, see the *Forms-based Application Development Tools User Guide*.

Appendix A: General Reference

This appendix provides information about specifying system file locations and configuring Ingres.

Location of System Files

The location you choose for Ingres system (executable) files will also contain the error log and configuration files. For performance reasons, choose a location for these files on a separate disk from your databases. On a three-disk system, choose a disk location that is separate from both your operating system and databases. Choose this location carefully because it cannot be easily changed once specified. During installation, the Ingres environment variable `II_SYSTEM` is set to this location.

Location of Database Files

The location for your databases contains the master database, `iidbdb`, which stores information about all databases, their locations, and the users who can access them. By default, this location also contains all user databases, unless the database administrator specifies an alternate location for a database when creating it. Choose this location carefully because it cannot be easily changed once specified.

When choosing this location, consider the following:

- Place database files on a separate disk from checkpoint, journal, and dump files to maximize chances for data recovery.
- On systems with three or more disks, do not place the database files on the same disk as your operating system, as it forces database scans to compete for I/O with system operations.
- Place database files on a separate disk from the transaction log files to improve system performance by optimizing disk I/O.
- Do not place database files on a device that is likely to become full as databases are added. Full disks can become fragmented, causing slow disk retrievals and degraded system performance.

Checkpoint, Journal, and Dump Files

Checkpoint, journal, and dump files provide for data recovery in case of a database disk failure. Checkpoints alone provide for data recovery up to the time of the checkpoint. Checkpoints and journals provide for recovery up to the time of failure. Checkpoint, journal, and dump files provide online checkpoints.

Location of Checkpoint, Journal, and Dump Files

Checkpoints, journals, and dump files can reside on the same device because journals and dump files are useful in recovery only if the associated checkpoint is also available. By default, the install program places journal and dump files in the same location as the checkpoint files.

Choose these locations carefully, because they cannot easily be changed once specified.

Important! Do not place the checkpoint device on the same disk as the database files. Storing data and backups on the same device provides poor insurance against disk failure. On single-disk systems, we recommend checkpointing to magnetic tape. Checkpointing to disk provides little safety if the disk fails.

Temporary Work Files

Work files are temporary files created during external sorts and other DBMS Server operations that require large amounts of temporary file space.

Location of Temporary Work Files

Work files can reside on the same device as the checkpoint files because work files are useful in recovery only if the associated checkpoint is also available. However, for highest performance, assign your temporary work files to a different physical device than your database, checkpoint, journal, or dump files. Choose this location carefully, because it cannot be easily changed once specified.

Note: For more information about temporary files and sorting, see the *Database Administrator Guide*.

Transaction Log Files

The transaction log file stores uncommitted transactions and buffers committed transactions before they are written to the database. Ingres uses one logical installation-wide log file to store information about all pending transactions in the installation. Each logical log file may consist of up to 16 physical disk files, which helps to alleviate I/O bottlenecks. To ensure that no committed transactions are lost if the primary transaction log devices fail, Ingres can maintain a backup of the primary transaction log file on the storage locations you specify.

Note: Disable the backup transaction log file only if the location you intend to use for your primary transaction log file has built-in fault tolerance—for example, a fault-tolerant disk array or “mirrored” disk sub-system.

Locations of Transaction and Backup Transaction Logs

Consider the following when choosing the locations for the transaction or backup transaction log file:

- If possible, avoid installing the primary and backup transaction log files on I/O-bound disks because this can increase data acquisition times of the Recovery Server and archiver process and slow down all users.
- If possible, put the transaction log file on separate disks from your database, checkpoint, dump, and journal files so that you can recover your unsaved, committed transactions if any of these disks fail.

Locations for these files are defined by the `log_file` (primary) and `dual_log` (backup) configuration parameters. You can add, modify, or delete locations for your primary and dual transaction log files using Configuration-By-Forms (cbf).

How You Change Log File Locations

You can change log file locations by using the Configuration-By-Forms (cbf) utility.

On Windows and on UNIX systems that use the visual tools, you can use Configuration Manager.

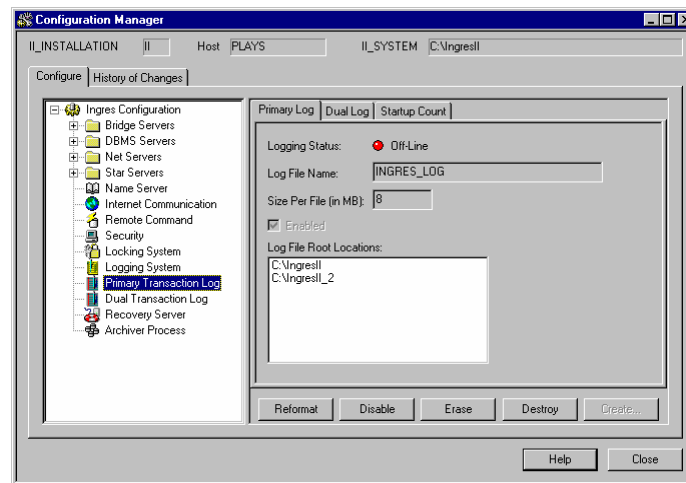
Note: To change your log file locations, you must first destroy your log file, and then create a new one.

Change Log File Locations Using Configuration Manager

On Windows and on UNIX systems that use the visual tools, you can use Configuration Manager to change log file locations.

Using Configuration Manager, you use the Primary Log and Dual Log pages to add, modify, or delete locations for your primary and dual transaction log files.

For example, in the following primary log configuration, another location has been added.



Installation Code

The installation code is a two-character code that identifies a specific installation on a node and allows all processes and images to be installed and shared successfully. The value of the installation code is stored in the II_INSTALLATION environment variable.

The first character must be a letter; the second character can be a letter or numeral. The default installation code is II.

If you have more than one installation on the same node, each installation on that node must have a unique installation code. For example, you can install and run a new version of Ingres under one installation code, while maintaining an existing older installation under a different installation code on the same computer or network node.

General Installation Parameters

General installation parameters apply to all installations.

The general installation parameters are as follows:

Ingres installation directory (II_SYSTEM)

Defines location of the product's system (executable) files.

DBMS Server Installation Parameters

The parameter settings when installing the Ingres DBMS Server are as follows:

Installation code (II_INSTALLATION)

Identifies the installation, as described in Installation Code (see page 134).

User ID (II_USERID)

Defines the user ID of the system administrator that owns the Ingres installation. The ID is added to the system if it does not exist.

Group ID (II_GROUPID)

Defines the group ID to which the system administrator user ID belongs and that owns the Ingres installation. The ID is added to the system if it does not exist.

Database location (II_DATABASE)

Defines the location for the Ingres master database (iiddb) and the default location for database files.

Checkpoint files location (II_CHECKPOINT)

Defines the location for the checkpoint files that serve as a static backup of the database.

Journal files location (II_JOURNAL)

Defines the location for the journal files, which provide a dynamic record of changes made to Ingres databases since the last checkpoint.

Dump files location (II_DUMP)

Defines the location for the dump files used to perform online backups.

Temporary work files location (II_WORK)

Defines the location for temporary files created during external sorts and other DBMS Server operations.

Default transaction log file size (LOG_KBYTES)

Defines the default transaction log file size. The default size (32768 KB per file) is adequate for most installations. You should change the file size only if you have an existing application that requires a larger transaction log file.

Ingres Net Parameters

The parameters you must specify when setting up Ingres Net depend on whether you are installing it on a networked DBMS Server installation or on a client installation.

When installing Ingres Net on a networked DBMS Server, the setup program prompts for the installation password. For other settings, the setup program uses the values you specified when setting up the DBMS Server (for example, the installation code and time zone parameters).

When installing Ingres Net on a client, the setup program prompts for the installation code, time zone, and DBMS Server host name.

Ingres Net setup parameters are as follows:

Installation password

Identifies users authorized for remote access to the DBMS Server on this installation. The installation password is an alphanumeric string and is valid for any Ingres-supported protocol, such as TCP/IP.

Installation code (II_INSTALLATION)

Identifies the installation, as described in Installation Code (see page 134).

Region and time zone (II_TIMEZONE_NAME)

Specifies the region of the world and the time zone in which this client installation is located, as described in World Region and Time Zone (see page 137).

DBMS Server host name

Identifies the name of the network node on which the DBMS Server that handles this client's requests resides.

NFS Client Parameters (UNIX)

When setting up an NFS client installation, you are prompted to supply values for the following parameters:

Value of II_SYSTEM as it appears on this client

Defines the path for the directory in the client's file system that is the NFS-mounted, shared II_SYSTEM directory on the DBMS Server installation.

Example: Suppose II_SYSTEM is set to "/local" on the DBMS Server installation on node "dublin" and the NFS mount command on the client is:

```
mount dublin:/local /m/dublin/local
```

The value of II_SYSTEM as it appears on the client is:

```
/m/dublin/local
```

Note: You must be logged on as the root user to use the mount command.

Installation code for this client (II_INSTALLATION)

Identifies this client installation with a two-character code.

World Region and Time Zone

You must specify the time zone for your installation. This value is stored in the II_TIMEZONE_NAME environment variable.

On some systems, the default value for II_TIMEZONE_NAME is NA-PACIFIC. If you are in a different time zone, you must change the value of II_TIMEZONE_NAME.

Time zone names are organized by world region. In some cases, the time zone name is a positive or negative offset from Greenwich Mean Time (for example, GMT2 or GMT-2). If you are unable to locate the correct time zone within one of the designated world regions, use the GMT-OFFSET world region and specify one of the GMT offsets as your time zone.

The time zone parameter tells Ingres what adjustments to make for Daylight Savings Time. If you must make other adjustments for special time changes imposed in your area (such as for energy conservation purposes), you can use the iizic time zone compiler provided in the distribution. For details on the iizic compiler, see the *Command Reference Guide*.

Time Zone Names

The world regions and their time zone names are as follows:

Africa

GMT
GMT1
GMT2
GMT3
GMT4

Asia

INDIA
JAPAN
KOREA
HONG-KONG
PAKISTAN
PRC
ROC
GMT5
GMT6
GMT7
GMT8
GMT9
GMT10
GMT11

Australia

AUSTRALIA-LHI
AUSTRALIA-NORTH
AUSTRALIA-WEST
AUSTRALIA-SOUTH
AUSTRALIA-TASMANIA
AUSTRALIA-QUEENSLAND
AUSTRALIA-VICTORIA
AUSTRALIA-NSW
AUSTRALIA-YANCO

Middle East

EGYPT
IRAN
ISRAEL
KUWAIT
SAUDI-ARABIA
GMT2
GMT3
GMT4

North America

NA-PACIFIC
NA-MOUNTAIN
NA-CENTRAL
NA-EASTERN
NA-ALASKA
CANADA-ATLANTIC
CANADA-NEWFOUNDLAND
CANADA-YUKON
MEXICO-GENERAL
MEXICO-BAJANORTE
MEXICO-BAJASUR

North-Atlantic

EUROPE-WESTERN
EUROPE-CENTRAL
EUROPE-EASTERN
IRELAND
MOSCOW
POLAND
TURKEY
UNITED-KINGDOM
GMT
GMT1
GMT2
GMT3

South America

BRAZIL-EAST
BRAZIL-WEST
BRAZIL-ACRE
BRAZIL-DENORONHA
CHILE-CONTINENTAL
CHILE-EASTER-ISLAND
GMT6
GMT5
GMT4
GMT3

South Pacific

NEW-ZEALAND
US-HAWAII
GMT10
GMT11
GMT12
GMT-12
GMT-11
GMT-10

Southeast Asia

INDONESIA-WEST
INDONESIA-CENTRAL
INDONESIA-EAST
MALAYSIA
PHILIPPINES
SINGAPORE
THAILAND
VIETNAM
GMT7
GMT8
GMT9

GMT-Offset

GMT-12
GMT-11
GMT-10
GMT-9
GMT-9-and-half
GMT-8
GMT-7
GMT-6
GMT-5
GMT-5-and-half
GMT-4
GMT-3
GMT-3-and-half
GMT-2
GMT-2-and-half
GMT-1
GMT
GMT1
GMT2
GMT3
GMT3-and-half
GMT4
GMT5
GMT5-and-half
GMT6
GMT7
GMT8
GMT9
GMT9
GMT10
GMT10
GMT11
GMT12
GMT13

Supported Character Sets

During installation, select the character set carefully because changing this value later can corrupt the data in your databases. The installation program provides a default value.

Ingres-supported character sets for the non-Unicode character data types are as follows:

Character Set	Description	Format
ALT	Support of Cyrillic on DOS	Single byte
ARABIC	Arabic-449-Plus	Single byte
CHINESET	Traditional Chinese - Taiwan	Double byte
CHINESES	Simplified Chinese - PRC	Double byte
CHTBIG5	Traditional Chinese - Taiwan, BIG5	Double byte
CHTEUC	Traditional Chinese - Taiwan, EUC	Double byte
CHTHP	Traditional Chinese - Taiwan, HP ROC15	Double byte
CSGB2312	Simplified Chinese - GB2312	Double byte
CSGBK	Simplified Chinese - GBK	Double byte
CW	Cyrillic on Windows 3.1	Single byte
DECMULTI	DEC Multinational (superset of ASCII) and default for VMS	Single byte
DOSASMO	IBM DOS ASMO Arabic (cp708)	Single byte
ELOT437	Greek for PC/RS6000/SCO-UNIX	Single byte
GREEK	DEC Greek Elot	Single byte
HEBREW	DEC Hebrew	Single byte
HPROMAN8	HP Roman8 (superset of ASCII)	Single byte
IBMPC437	IBM PC Code Page 437 (US and English)	Single byte
IBMPC850	IBM PC Code Page 850 (Multilingual), includes accented characters	Single byte
IBMPC866	IBM PC 866 (Cyrillic for DOS)	Single byte
IS885915	ISO 8859/2 (Latin and some Greek). Identical to ISO 8859/1 Latin, except for eight characters, including the Euro currency symbol (€, Unicode U+20AC).	Single byte

Character Set	Description	Format
ISO88591	ISO 8859/1 Latin and default for UNIX (superset of ASCII)	Single byte
ISO88592	8859/5 (Latin and Cyrillic)	Single byte
ISO88595	8859/9 (Latin and some Turkish) CP 920	Single byte
ISO88599	ISO 8859/15 (Latin and Euro sign)	Single byte
KANJIEUC	Japanese, EUC	Double byte
KOI18	KOI 8-bit (ISO 6937/8), Russia	Single byte
KOREAN	Korean	Double byte
PC857	IBM PC Code page 857 - Turkish	Single byte
PCHEBREW	IBM PC / MSDOS Hebrew	Single byte
SHIFTJIS	Shift-JIS Japanese	Double byte
SLAV852	IBM PC Code Page 852 (Slavic)	Single byte
THAI	DEC Thai Tis	Single byte
WARABIC	Arabic	Single byte
WHEBREW	Microsoft Windows Hebrew	Single byte
WIN1250	Eastern Europe: Windows page 1250	Single byte
WIN1252	Windows code page 1252 - Latin 1 (Western Europe) and default for Windows	Single byte
WTHAI	IBM/Windows Thai (cp874)	Single byte

How the DBMS Server Setup Program Works

The setup program for the DBMS Server performs the following tasks:

- Assigns a unique installation code that you specify for this installation.
- For new installations, creates the default directory for your databases according to your specification, and creates the system catalogs master database.
- For new installations, creates directories for the checkpoint, journal, dump, work, primary transaction log, and backup transaction log files, according to the locations you specify.
- Allows you to specify or change (for an upgrade) the transaction log size, number of concurrent users, time zone setting, and the character set (for new installations only) for this installation.
- Checkpoints the iidbdb master database.
- Checks that your system has adequate resources to run as configured.
- Upgrades all databases for an existing Ingres Server installation, if you elected to do so at this time.

How the Ingres Net Setup Program Works

When configuring Ingres Net in a client installation, Ingres Net setup performs the following tasks:

- Assigns a unique installation code that you specify for this client installation.
- Sets the II_TIMEZONE_NAME environment variable to the world region and time zone values you specify for this installation.
- Configures the Ingres Net listen address.
- Stores a copy of the DBMS Server installation's password, if you have specified it, to enable the DBMS Server to recognize this client.

When configuring Ingres Net in a DBMS Server installation, the installer does not allow you to specify an installation password during the setup procedure. You must specify it later, using the Ingres Network Utility or Visual DBA or, for OpenVMS, the netutil utility. For more information, see the *Connectivity Guide*.

Ingres Servers

The following server types are available, depending on your particular installation:

Bridge Server

Enables network communications between an Ingres client using one network protocol and an Ingres server using another network protocol.

Communications Server

Provides network communications that let users connect to databases belonging to other installations through Ingres Net.

DBMS Server

Allows users access to your installation's databases.

Data Access Server

Translates requests from the Ingres JDBC Driver and forwards them to the appropriate DBMS Server.

ICE Server

Allows developers to build World Wide Web applications that can access enterprise-wide corporate data, through the Ingres Web Deployment Option.

JDBC Server

Acts in tandem with the JDBC driver to provide JDBC access to Ingres.

Name Server

Keeps track of all the servers associated with an installation.

Recovery Server

Handles online recovery from server and system failures.

Remote Command Server

Allows the execution of remote operating system commands.

Star Server

Allows users to connect to multiple databases simultaneously through Ingres Distributed Option.

Valid Computer, Directory, and User Names

Computer, directory, and user names must be valid for the operating system that Ingres is being installed on and also adhere to the following restrictions.

Computer names

Ingres supports computer names that contain the following ASCII characters only: alphanumeric and hyphen (-). Computer names must not start with a hyphen.

Directory path

A valid Ingres directory path has slightly different syntax on UNIX and Windows.

On both UNIX and Windows, a directory name must start with an ASCII letter (that is, a-z and A-Z) or a digit (0-9), and can continue with ASCII letters, digits, and the following symbols: space, hyphen (-), underscore (_), full stop (.), colon (:), left square bracket ([), right square bracket (]), tilde (~).

Note: Windows does not allow a colon in a directory name.

UNIX and Linux: Absolute directory paths must start with a forward slash (/) and continue with a relative directory path. A relative directory path contains a number of directory names separated by /, as in the following example:

```
/usr/local/ingresII
```

Windows users should note that on UNIX and Linux, uppercase letters are distinct from lowercase ones (for example, a is not the same as A).

Windows: Absolute directory paths must start with a drive specification (a drive letter immediately followed by a colon), a backward slash (\), and then a relative directory path, as in the following example:

```
c:\program files\ingres\ingresII
```

The directory name can also start with underscore (_).

UNIX and Linux users should note that on Windows uppercase letters are not distinct from lowercase letters (for example, a is the same as A).

In general, we recommend that path names not be distinguished by case.

User names

Ingres supports user names that contain the following ASCII characters only: alphanumeric, at (@), pound (#), dollar (\$), underscore (_). User names must not start with @, #, \$, or a digit. These restrictions apply to the user names used to install Ingres and to connect to Ingres. Passwords must not exceed 20 characters.

Appendix B: UNIX Installation Worksheet

This appendix provides worksheets to aid in installing Ingres on UNIX, including a regular worksheet and an NFS client worksheet.

UNIX Installation Worksheet

Worksheet for Installation _____ on Host _____

Required Parameter	Default Value	Value
General Ingres Installation Parameters		
Ingres installation directory (II_SYSTEM)	/opt/Ingres/Ingres	
Ingres DBMS Server Parameters		
Installation code (II_INSTALLATION)	II	
Database location (II_DATABASE)	/opt/Ingres/Ingres	
Checkpoint files location (II_CHECKPOINT)	/opt/Ingres/Ingres	
Journal files location (II_JOURNAL)	/opt/Ingres/Ingres	
Dump files location (II_DUMP)	/opt/Ingres/Ingres	
Temporary work files location (II_WORK)	/opt/Ingres/Ingres	
Default transaction log file size (LOG_KBYTES)	32768 KB	
Transaction log file location	/opt/Ingres/Ingres	
Backup transaction log file location	/opt/Ingres/Ingres	
Database Connection Limit (II_CONNECT_LIMIT)	32	
Region and time zone (II_TIMEZONE_NAME)	NA-PACIFIC	
Character set (II_CHARSET)	ISO88591	
Comply with ANSI/ISO Entry SQL-92 database standards? (II_SQL92)	0 (for "no")	

Required Parameter	Default Value	Value
Ingres Net Parameters (if this installation also includes a DBMS Server)		
Installation password for this DBMS Server		
Ingres Net Parameters (for client-only installations)		
Installation code for this client (II_INSTALLATION)	II	
Region and time zone for this client (II_TIMEZONE_NAME)	NA-PACIFIC	
DBMS Server host name		
Listen address for the DBMS Server that will handle this client's requests		
Installation password for the DBMS Server		
Installation password for the DBMS Server that will handle this client's requests		

NFS Client Worksheet

NFS Client Worksheet for Installation _____ on Host _____

Required Parameter	Default Value	Value
Value of II_SYSTEM as it appears on client (if setting up client from the DBMS Server)		
Installation code for this client (II_INSTALLATION)	II	
Region and time zone for this client (II_TIMEZONE_NAME)	NA-PACIFIC	
Installation password for the DBMS Server handling this client's requests		

Appendix C: OpenVMS Installation Worksheet

This appendix provides a worksheet to aid in installing Ingres on OpenVMS.

OpenVMS Installation Worksheet

Worksheet for Installation_____ **On Node**_____

The "Value" column shows the default values that appear on your screen during the VMSINSTAL process, *if you are installing the product for the first time*. If you do not want to use the default, enter a different value in this column on the worksheet. If you are upgrading an existing installation, the *existing* value, if any, appears in brackets on your screen.

Shaded areas indicate values you supply for new installations only. Leave them blank if upgrading an existing installation.

Required Parameter	Value
General Ingres Installation Parameters	
User name for the system administrator account (The user name and UIC of each system administrator account will be different for each Ingres installation on a given node.)	
User identification code (UIC) for the system administrator account The user name and UIC of each system administrator account will be different for each Ingres installation on a given node.)	
Location for the Ingres and Ingres tools system files (II_SYSTEM)	
Distribution medium	
DBMS Server Parameters	
Will group logicals be used?	[yes]

Required Parameter	Value
Installation code (II_INSTALLATION) required for group-level installations only	
Database location (II_DATABASE)	
Checkpoint files location (II_CHECKPOINT)	
Journal files location (II_JOURNAL)	
Dump files location (II_DUMP)	
Temporary work files location (II_WORK)	
Default transaction log file size	[32 MB]
Transaction log file location	
Backup transaction log file location	
Number of Concurrent Users	[32]
Region and time zone (II_TIMEZONE_NAME)	
Character set (II_CHARSET)	[DECMULTI]
Comply with ANSI/ISO Entry SQL-92 database standards?	[no]

Ingres Net Parameters (if this installation also includes a DBMS Server)

None. To specify an installation password for the DBMS Server, you must use the netutil utility. For details, see the *Connectivity Guide*.

Ingres Net Parameters (for client-only installations)

Installation code for this client, for group-level installations only (II_INSTALLATION)	[II]
Region and time zone for this client (II_TIMEZONE_NAME)	
DBMS Server host name	
Listen address for the DBMS Server that will handle the requests of this client	[II_INSTALLATION]
Installation password for the DBMS Server that will handle the requests of this client	

Appendix D: System Requirements for OpenVMS

This appendix provides information about system hardware and Ingres Net requirements and SYSGEN parameters that affect Ingres operations. It also describes recommended OpenVMS process resources and required VMS privileges.

Note: The recommended values mentioned in this appendix are for a minimal Ingres installation. Requirements for your system may vary, depending on the products you install and the maximum number of users. For values that may be better suited to your environment, see the Ingres customer support page, accessible from <http://ingres.com>.

System Hardware Requirements on OpenVMS

The following table describes typical system hardware requirements.

Note: Check the Readme file for changes to the following requirements that are specific to your platform.

Element	Typical Requirement						
Number of disks	At least two separate storage devices for your databases and checkpoint files are strongly recommended.						
Disk space	<p>The amount of space required on any one particular disk is determined by the number of disks in your configuration, the packages you are installing, and the locations you choose for your files.</p> <p>Peak system disk utilization is approximately 1.2 x kit size.</p> <p>The default file size for your primary and backup transaction log files is 32 MB. However, the recommended size is between 100 and 400 MB, or larger.</p> <p>For help in determining space requirements for II_DATABASE, see the <i>Database Administrator Guide</i>.</p>						
Physical Memory	For a DBMS Server installation: <table border="1"><thead><tr><th>OS</th><th>Required</th><th>Recommended</th></tr></thead><tbody><tr><td>Alpha</td><td>128 MB</td><td>512 MB or more</td></tr></tbody></table>	OS	Required	Recommended	Alpha	128 MB	512 MB or more
OS	Required	Recommended					
Alpha	128 MB	512 MB or more					

SYSGEN Parameters that Affect Operation

It is important to understand the way OpenVMS parameter settings affect Ingres.

For information on tuning OpenVMS, see your OpenVMS documentation.

Note: Check the Readme file for changes to the following requirements that are specific to your platform.

The following table lists SYSGEN parameters that affect Ingres operation:

Element	Description	Considerations
CHANNELCNT	Number of open I/O channels permitted each OpenVMS process at any one time	<p>This parameter is critical to the successful execution of the DBMS Server. If the setting is too large, it wastes system memory; if too small, it limits Ingres I/O capabilities. Since the DBMS is multi-threaded, it effectively requires the same CHANNELCNT setting as if it were several individual processes.</p> <p>Use the following formula to calculate an approximate value, where <i>sessions</i> is the total number of connected sessions and <i>file_limit</i> is the total number of files that can be open at one time:</p> $\text{CHANNELCNT} = (\textit{sessions} * 4) + \textit{file_limit}$ <p>In general, set CHANNELCNT to a very large number.</p> <p>The <i>file_limit</i> (fillm) requirements will vary over time. The DBMS Server will, at most, open every file in every database, plus approximately five for the transaction log and error log files.</p>

Element	Description	Considerations
GBLSECTIONS	<p>Determines the maximum number of global sections that can be made known to the system by allocating the necessary storage for the Global Storage Table (GST) entries</p> <p>Example value for Alpha: 800</p>	<p>Several Ingres components use global pages of memory to enable multiple processes to share data.</p> <p>Examples are:</p> <ul style="list-style-type: none"> Fast message storage that keeps an in-memory copy of Ingres message files Multiple DBMS Servers configured to share in-memory caching of Ingres data pages
GBLPAGES	<p>Determines the size of the global page table and the limit for the total number of global pages that can be created</p> <p>Example value for Alpha: 250,000</p>	<p>Logging and locking system shared memory, which is allocated from global pages at startup time (the size of which is determined by the configuration of the logging and locking system)</p>
GBLPAGFIL	<p>Establishes the maximum number of global pages with page file "Backing Storage Address" storage that can be created</p> <p>Example Value for Alpha: 40,000</p>	<p>On Alpha, memory pages are at least 8 KB in size. At this size, four Ingres pages fit in each Alpha memory page. Note that Alpha pages can be from 8 KB to 16 KB in size. See your OpenVMS Alpha documentation.</p> <p>To examine entries and available pages and sections, use the INSTALL utility and issue LIST/GLOBAL and LIST/GLOBAL/SUMMARY.</p>

Element	Description	Considerations
NPAGEDYN	Non-paged dynamic pool; determines the number of bytes to allocate for the non-paged dynamic pool	<p>Used in allocating the logging and locking system in previous Ingres releases.</p> <p>Ingres uses GBLPAGES (global pages) rather than NPAGEDYN and NPAGEVIR to allocate the logging and locking system shared memory at startup time.</p>
NPAGEVIR	Virtual non-paged pool; determines the number of bytes to which the non-paged pool may be extended	<p>Used in allocating the logging and locking system in previous Ingres releases.</p> <p>Ingres uses GBLPAGES (global pages) rather than NPAGEDYN and NPAGEVIR to allocate the logging and locking system shared memory at startup time.</p>
PQL_*	PQL_parameters; PQL_D is the default and PQL_M is the minimum process quotas that OpenVMS uses when creating detached processes (of which Ingres generates several)	<p>If a value is not specified on the command line when Ingres processes are started, the PQL default is used. If the process specifies a value below the PQL minimum, the current minimum is used. If the creator has DETACH privilege, any of the values can be overridden, which is crucial to the successful startup of Ingres processes.</p> <p>To examine the resulting process configuration, use:</p> <pre>SHOW PROCESS/QUOTA/ID=pid</pre>

Element	Description	Considerations
VIRTUALPAGECNT	<p>Maximum virtual page count; determines the total number of pages that can be mapped for a process, which can be divided in any fashion between P0 and P1 space</p> <p>Beginning with OpenVMS 7.0, this parameter ceased to be tunable on Alpha as the process page tables have migrated from system space to a dedicated page table space. See your OpenVMS documentation for details.</p>	<p>The DBMS Server process can grow to require large numbers of virtual pages due to the complexity of its facilities and their various caches. It is critical that this process be able to expand its memory regions as necessary.</p> <p>If an error occurs while trying to expand the virtual size of the server, first examine the process page file quota, and then examine this system-wide limit. To do so, set the process page file quota to the current VIRTUALPAGECNT and start the server. If this does not resolve the problem, this parameter needs to be adjusted upwards.</p> <p>To examine current usage, use: SHOW PROCESS/QUOTA/ID=pid</p>
WSMAX	<p>Maximum size of process working set; determines the system-wide maximum size of a process working set, regardless of process quota</p> <p>Example value for Alpha: 130,000</p>	<p>This parameter limits the size of the physical memory that any OpenVMS process can grow to consume. To prevent Ingres processes from spending overhead page faulting, be sure to configure them with a working set large enough to reduce or eliminate the amount of swapping and/or paging required.</p> <p>Distinguish hard faults (disk reads/writes, which are expensive) from soft faults (memory read/writes, which are more tolerable).</p>

Recommended OpenVMS Process Resources

Check and set the OpenVMS process resources, if necessary, for the following accounts:

- System administrator account
- User accounts
- Database administrator accounts

Almost all OpenVMS process quotas impart a cost only when a given resource is requested and consumed. If you limit the Ingres process resources, it may function, but its performance may be impaired. Therefore, we generally recommend high resource quotas for the system administrator account. If performance is a critical issue, try setting the quota to infinity, if permitted.

The following table shows the recommended minimum process resources for the system administrator. When the install program creates the system administrator account, it automatically sets the process resources to the recommended minimums shown in the table.

Database administrators who checkpoint their own databases (as opposed to the system administrator) indirectly use OpenVMS backup. You should set UAF parameters for their accounts. For details, see the OpenVMS backup manual.

UAF Name	Description	Recommended Starting Value
BYTLM	Buffered I/O byte count limit	500,000
TQELM	Timer queue entry limit	40
PGFLQUO	Paging file quota (possibly set to the system virtual page count)	250,000
DIOLM	Direct I/O count limit	200
BIOLM	Buffered I/O limit	400
FILLM	Open file limit	1000
PRCLM	Subprocess creation limit	15 or larger - Alpha
ASTLM	AST queue limit	200
ENQLM	Enqueue limit (non-cluster)	2048
JTQUOTA	Job logical name table byte limit	20,000

UAF Name	Description	Recommended Starting Value
MAXDETACH	Maximum detached processes limit	0 (infinity)
PRIV	Privileges	ALTPRI, CMKRNL, IMPERSONATE, EXQUOTA, OPER, PRMGBL, PRMMBX, READALL, SHARE, SYSGBL, SYSLCK, SYSNAM, SYSPRV, TMPMBX, WORLD
DEVICE DIRECTORY	Device and directory for default login	II_SYSTEM: [Ingres]
DEFPRIV	Default privileges	ALTPRI, CMKRNL, IMPERSONATE, EXQUOTA, OPER, PRMGBL, PRMMBX, READALL, SHARE, SYSGBL, SYSLCK, SYSNAM, SYSPRV, TMPMBX, WORLD

OpenVMS Quotas and Ingres Parameters

OpenVMS quotas and their corresponding Ingres parameters are listed here. Adjust the Ingres parameters using Configuration-By-Forms to reflect the OpenVMS quota settings.

Ingres Configuration	OpenVMS (Authorize) Entry
vms_ast_limit	ASTIm
vms_buffer_limit	BYTIm
vms_extent	Wsextent
vms_file_limit	Fillm
vms_io_buffered	BIOIm
vms_io_direct	DIOIm
vms_maximum_working_set	Wsquo
vms_page_file	Pgflquo
vms_privileges	DEFPRIVILEGES
vms_queue_limit	Enqlm
vms_working_set	Wsdef

Required OpenVMS Privileges

The system administrator account must have the following OpenVMS privileges:

ALTPRI
CMKRNL
EXQUOTA
IMPERSONATE
OPER
NETMBX
PRMGBL
PRMMBX
READALL
SHARE
SYSGBL
SYSLCK
SYSNAM
SYSPRV
TMPMBX
WORLD

If the install program creates the system administrator account, it automatically assigns these privileges.

Note: If you want to turn off the `vms_accounting` parameters, which allow the Ingres processes to be started without a record in the VMS accounting file, the system administrator will also need the ACNT privilege. (If this is the case, all processes started by the administrator will not be in the VMS accounting audit trail).

Appendix E: OpenVMS Installation Example

This appendix contains examples of the complete set of screen displays and setup scripts for a standard installation procedure for a networked DBMS Server installation.

Conventions Used in Installation Example

In the following scripts, bold typeface indicates user input. For example:

Please enter a valid time zone:
na-pacific

<Return> indicates that the user has pressed the Return key to accept a default entry displayed in brackets ([]), as in this example:

Please enter a valid installation code [II]
<Return>

Setup Script—Install a Networked DBMS Server on OpenVMS

This example contains the text of sample setup scripts for setting up the Ingres DBMS Server and Ingres Net products on a two-disk system.

Both the Ingres DBMS Server and Ingres Net setup programs are executed, one after the other. The responses of the person installing the product appear in bold typeface.

The example assumes that the system administrator account has been created.

In the script, a group name of TINGRESDB is used. The second disk, installed to contain the database files, requires the following DEFINE command:

```
$ define/group/trans=concealed II_DB_LOC DUA200: [DATABASE.]
```

To start the example installation script, invoke the VMSINSTAL utility, as follows:

```
$ @sys$update:vmsinstal * distribution_medium
```

The setup script is as follows:

```
OpenVMS AXP Software Product Installation Procedure V7.3-1
```

```
It is 25-JAN-2006 at 10:17.
```

```
Enter a question mark (?) at any time for help.
```

```
%VMSINSTAL-W-NOTSYSTEM, You are not logged in to the SYSTEM account.
```

```
%VMSINSTAL-W-ACTIVE, The following processes are still active:
```

```
    TCPIP$FTP_1
```

```
    TINGRESDB
```

```
* Do you want to continue anyway [NO]? y
```

```
* Are you satisfied with the backup of your system disk [YES]? <Return>
```

```
The following products will be processed:
```

```
INGRES_9041 V0.A
```

```
Beginning installation of INGRES_9041 V0.A at 15:45
```

```
%VMSINSTAL-I-RESTORE, Restoring product save set A ...
```

```
%INGRES_9041-I-BEGIN, Beginning the installation of Ingres
```

```
%INGRES_9041-I-RELEASE, This version is II 9.0.4 (axm.vms/100)
```

This procedure may be used to either create new installations, upgrade older installations, or to add product packages to existing ones.

Ingres Corporation strongly recommends reading all appropriate documentation prior to performing any installation, most notably the release notes for this release and the:

Ingres Getting Started Guide

* Display explanatory text prior to each question [Yes]? <Return>

Ingres Installations

A given system may have multiple, functionally independent INGRES configurations called "installations". While more complete information on installations may be found in the Ingres Getting Started Guide, the following may be helpful in making decisions while running this procedure.

Each installation has its own UNIQUE:

- 1) Directory tree (excepting CLIENT ONLY installations) pointed to by the II_SYSTEM logical name.
- 2) Group UIC code (usually the UIC of an INGRES account)
- 3) Installation ID (two letters with the first being unique)

Multiple installations play an important role for most customers. It is helpful to consider multiple installations before beginning.

* Do you have, or plan to have multiple installations [Yes]? <Return>

Required Information

This procedure requires the following information:

- 1) A location to put the necessary files. This may be an existing location, or it can be created by this procedure.
- 2) A File Owner UIC. The UIC may remain unchanged or be reset for existing installations, or for new installations, may be either an existing UIC, or an account may be created by this procedure.
- 3) A List of packages to install. The list may be all available packages or only selected packages.

* Press return to continue [continue]: <Return>

Accessing a Specific Installation

Access to the appropriate installation is accomplished primarily through use of the appropriate logical names. Each installation keeps its set in a logical name table. "Production" installations use the LNM\$SYSTEM table, and all others use their Group UICs' LNM\$GROUP table.

Keeping Track of Multiple Installations

It is ultimately your responsibility to maintain your installations and keep them separate. However, this procedure will record each installation in a simple text file as it occurs.

Prior installations may not have been logged, so a tool is provided which will help you populate and view the contents of this file. The file is maintained on the system disk to be globally accessible, and its specification is: SYS\$COMMON:[SYSEXE]INGRES_INSTALLATIONS.DAT. The tool is II_SYSTEM:[INGRES.INSTALL]II_INSTALLS.COM.

* Press return to continue [continue]: <Return>

Be Aware of Existing Installations

Before defining the details of this installation, it is important to know as much as possible about the status and detail of previous installations. This section provides an opportunity to discover other installations, and perform appropriate action.

INGRES RDBMS Installation History Log

This log may be edited, or manipulated with the II_INSTALLS.COM procedure located in the II_SYSTEM:[INGRES.INSTALL] directory. If editing, retain sequential order of WRAPPED rows.

The following INGRES installations were previously recorded:

Date	Owner UIC	II_SYSTEM	Package list
18-APR-2005 09:41:10.50	(axm.vms/100)	SERVER1\$DUA200:[TIDEVBB.]	[300,1] custominst

* Press return to continue [continue]: <Return>

Installation Ownership

An owner must be assigned to the files making up an installation. It is recommended that each installation has its own OpenVMS account. This account, if it exists, is generally known as "the INGRES account". In any event, the GROUP portion of the ownership UIC MUST BE UNIQUE from all other INGRES installations. This is because the LNM\$GROUP logical name table is used for each installations logicals.

Please choose how you will define the Ownership of this installation:

- 1) Provide the USERNAME of the INGRES account for this install.
If it does not exist, it can be created by this procedure.
- 2) Provide the Owner UIC, or Rights Identifier. It must exist.
- 3) For existing installations only, retain the current owner.

* Your choice please [1]: <Return>

* Username [INGRES]: TINGRESDB

%INGRES_9041-I-ACNTEXISTS, The specified account exists.

Disk and Directory Location for this Installation

This procedure requires that you provide a location which will contain the [INGRES] directory and its subdirectories, Ingres executable images, and miscellaneous configuration files and command procedures.

This location is known as II_SYSTEM: and is a device specification. By defining II_SYSTEM as a "rooted directory," the [INGRES] directory may be located within another directory. An example is the OpenVMS logical SYS\$SYSROOT, which is typically defined as
SYS\$SYSDEVICE:[SYS0.]

Please provide the appropriate device and directory specification within which the directory [INGRES] will reside. Note that while logical names may be provided now, their translation into a real device and optional directory specification will be coded into the definition of II_SYSTEM used for Ingres startup; they themselves will not be used.

* Location for this installation [SERVER1\$DUA200:[DATABASE]]: II_DB_LOC:
%INGRES_9041-I-EXISTS, Location SERVER1\$DUA200:[DATABASE] exists.

*Confirm use of location SERVER1\$DUA200:[DATABASE] [Yes]? <Return>

%INGRES_9041-S-SELECTED, Location SERVER1\$DUA200:[DATABASE] was selected.

%INGRES_9041-S-DEFINED, II_SYSTEM is defined as SERVER1\$DUA200:[DATABASE.]

%INGRES_9041-I-GETUSER,Installation owner- Username:TINGRESDB,UIC:656,3]

Choose which Packages to Install

* Would you like to perform a package install (not customized) Yes]? <Return>
%INGRES_9041-I-PACKAGES, Now retrieving listing of packages.

You have the following options:

- 1) Display all packages and return to this menu.
- 2) Describe selected package, and return to this menu.
- 3) Install selected package.

NOTE: Only 1 package can be selected.

* Your choice please [3]: <Return>

Please select from the following list by responding to each prompt.

Feature name	Package
-----	-----
netclient	Ingres Networked client
* Select this package [YES]? n	
custominst	Full Installation
* Select this package [YES]? n	
dbmsnet	Ingres Networked DBMS server
* Select this package [YES]? <Return>	
dbmsstar	Ingres Networked DBMS server w
* Select this package [YES]? n	
standalone	Ingres Stand-alone DBMS server
* Select this package [YES]? n	

You have selected the following packages to be installed:

Feature name	Package
-----	-----
dbmsnet	Ingres Networked DBMS server

* Please confirm [Yes]? <Return>
%INGRES_9041-I-RESOLVE, Resolving a unique file list for this
installation.

* Do you want to run the configuration IVP following this installation [Yes]?
<Return>

```

                                Installation Summary

                                II 9.0.4 (axm.vms/100)
Location:                        SERVER1$DUA200:[DATABASE]
This location:                   Exists.

Owner UIC:                       [656,3]

Packages Selected:               dbmsnet

Configuration IVP:              Will be performed.
```

* Do you want to continue [Yes]? <Return>

%INGRES_9041-I-NOMOREQ, There are no more questions until the Ingres IVP.
%INGRES_9041-I-CONTINUE, The Installation will now continue for some
time.
%INGRES_9041-I-SCRIPT, Creating scripts tailored for this installation.

For your convenience, the following script is provided to remove any
files replaced by this installation:

```
II_SYSTEM: [INGRES.UTILITY]PURGE_FILES.COM
```

Be sure to run it only after a SYSTEM reboot, before Ingres is
started or after deinstalling the images with the OpenVMS INSTALL
utility.

%INGRES_9041-I-CREATEDIR, Now creating [INGRES] subdirectories, as
required.
%INGRES_9041-W-SECURITY, Ownership and protection will be reset to INGRES
defaults.
You may ignore 'already exists' messages...

%CREATE-I-EXISTS, SERVER1\$DUA200:[DATABASE.][INGRES] already exists
%CREATE-I-EXISTS, SERVER1\$DUA200:[DATABASE.][INGRES.SIG] already exists
%VMSINSTAL-I-RESTORE, Restoring product save set B ...
%INGRES_9041-I-MVFILES, Renaming non-unique file names...
%INGRES_9041-I-MVFILES, Renaming completed.
%INGRES_9041-I-SETPROFILES, Setting protection on files...

```
%INGRES_9041-I-SETPROFILES, Setting protection completed.  
%INGRES_9041-I-DELETEOLDFILES, Deleting files from the old  
installation...  
%INGRES_9041-I-DELETEOLDFILES, Deleting files completed.
```

Notice:

If you wish Ingres to start whenever the system is rebooted, add the following line to an appropriate place in SYSTARTUP_VMS.COM:

```
@SYS$STARTUP:INGRES_STARTUP.COM
```

And...

Edit the file SYS\$STARTUP:INGRES_STARTUP.COM to ensure it is correct for your environment. A line is added to start EACH installation, but the line is commented out to prevent accidental errors.

PLEASE EDIT SYS\$STARTUP:INGRES_STARTUP.COM TO MEET YOUR NEEDS.

PLEASE NOTE:

In order to start running the Ingres DBMS server, you should first run all the necessary setup programs as documented in the Ingres Getting Started guide and then run "ingstart". Before running the setup programs, you must be prepared to perform all of the setup and configuration phases. This requires decisions to be made about how Ingres shall be used. Usually, changes cannot be made while the installation is up and running. Ingres Corporation STRONGLY RECOMMENDS reading the Ingres Getting Started Guide prior to this step. Refer to the Ingres Getting Started Guide for more information about starting and using Ingres.

Also, the following scripts have been provided to setup INGRES symbols:

```
II_SYSTEM:[INGRES]INGSYSDEF.COM : defines Ingres sysadmin symbols  
II_SYSTEM:[INGRES]INGDBADEF.COM : defines Ingres DBA symbols  
II_SYSTEM:[INGRES]INGUSRDEF.COM : defines Ingres user symbols
```

This procedure will set up the Ingres DBMS.

In the course of this process you will be asked many questions that help configure the installation.

Alternatively, you may choose the EXPRESS option which will result in as few questions as possible; where feasible, defaults will be chosen.

Do you wish to choose the EXPRESS option? (y/n) **n**

Setting up the Ingres DBMS...

This procedure will set up the following release of the Ingres DBMS:

II 9.0.4 (axm.vms/100)

to run on local node:

SERVER1

This installation will be owned by:

TINGRESDB [TINGRESDB]

Do you want to continue this procedure? (y/n) **y**

Ingres has the capability to guarantee integrity of all committed database transactions in the event of a system software failure or single storage device failure. **IMPORTANT NOTE:** if a second storage device fails before recovery from an initial failure has taken place, committed transactions may be lost.

If you intend to take full advantage of this capability, you need to have at least two independent storage devices available (one in addition to the one Ingres is being installed on). If you do not have two independent storage devices available, but would like to take advantage of this capability, you should not complete this setup procedure at this time.

Do you want to continue this procedure? (y/n) **y**

You have the option of setting up this installation using GROUP or SYSTEM logical names to store configuration data.

You may only use SYSTEM logicals if no existing INGRES installation on this machine already uses them. If there is an existing installation on this machine which uses SYSTEM logicals, then this installation must be set up using GROUP logicals.

Unlike SYSTEM logicals, GROUP logicals can be used to set up multiple INGRES installations on the same machine. Before you set up this installation using GROUP logicals however, be sure that no existing INGRES installation on this machine is set up to use SYSTEM logicals under an account which has the same GROUP UIC as the account being used for this installation. Therefore, it is permissible to set up this installation using GROUP logicals if there is a SYSTEM level installation set up under an account with a different GROUP UIC.

Do you want to continue this procedure? (y/n) **y**

Do you want to set up this installation using GROUP logicals? (y/n) **y**

You have chosen to set up this installation using GROUP logicals.

If there is another INGRES installation on this machine which is set up under an account with the same GROUP UIC as this account, do not continue this setup procedure.

Do you want to continue this procedure? (y/n) **y**

Generating default configuration...

To differentiate between multiple INGRES installations set up to run on the same machine using GROUP level logical names, you must assign each installation a two-letter code that is unique across the machine.

The first character of the installation code must be a letter; the second character may be a letter or a number. You may use any code which satisfies these conditions except for the following:

"AA" may not be used since it is the installation code used for SYSTEM level installations.

"TT" may not be used since it translates to the VMS terminal identifier.

The installation code you select will be assigned to the GROUP level logical II_INSTALLATION when you start Ingres. Before you choose an installation code, make certain that it is not already in use by another (GROUP level) installation on this machine.

Please enter a valid installation code: **DB**

This program prompts you for the default physical storage locations you want to use (if not already configured) for the database, backup, temporary, and transaction log files maintained by the Ingres DBMS. Before you respond to these prompts, you have the option of reading detailed instructions on configuring the default Ingres storage locations.

Do you want instructions on configuring Ingres storage locations? (y/n) **y**

Ingres Location Logicals

The Ingres storage locations and their corresponding VMS logicals are listed below:

VMS Logical	Description
-----	-----

II_DATABASE	Default location for database files
II_CHECKPOINT	Default location for full backup files
II_JOURNAL	Default location for incremental backup files
II_DUMP	Default location used to store transactions during on-line backups
II_WORK	Default location for temporary files

Press RETURN to continue:<Return>

Assigning Locations

The values you assign to the default Ingres location logicals must be device names or concealed device logical names (i.e. "\$DISK1:", "INGDEV:"). If you do not have at least two devices or concealed device logical names defined at this time, you should not continue this setup procedure.

NOTE: You can change a default Ingres storage location under VMS simply by redefining the appropriate logical(s) and relocating the directory associated with the location. You can also create additional storage locations and assign individual databases to them at any point after the setup procedure has been completed. For information on creating additional storage locations, refer to the Ingres Database Administrator's Guide.

Do you want to continue this procedure? (y/n) **y**

The Default Database Location

The Ingres variable II_DATABASE stores the default location used for all Ingres database files. If the physical device corresponding to the II_DATABASE location fails, all databases stored on it may be lost.

Press RETURN to continue:<Return>

Please enter the default location for your Ingres database files.

II_DATABASE: II_DB_LOC:

Creating II_DB_LOC:[ingres.data] ...

The Default Checkpoint, Journal and Dump Locations

The Ingres variables II_CHECKPOINT, II_JOURNAL, and II_DUMP are used to store the default locations used for off-line, on-line, and incremental on-line backup files. It is essential that II_CHECKPOINT, II_JOURNAL, and II_DUMP not be assigned to the same physical device as II_DATABASE. If this restriction is ignored, you will be unable to recover lost data in the event an II_DATABASE storage device failure.

Refer to the chapter on "Backup and Recovery" in the Ingres Database Administrator's Guide for instructions on backup and recovery of Ingres databases.

Press RETURN to continue:<Return>

Please enter the default location for your Ingres checkpoint files.
II_CHECKPOINT: II_DB_LOC:

Creating II_DB_LOC:[ingres.ckp] ...

Please enter the default location for your Ingres journal files.
II_JOURNAL: II_DB_LOC:

Creating II_DB_LOC:[ingres.jnl] ...

Please enter the default location for your Ingres dump files.
II_DUMP: II_DB_LOC:

Creating II_DB_LOC:[ingres.dmp] ...

The Default Work Location

The Ingres variable II_WORK stores the default location used for all temporary files created during external sorts and other DBMS server operations that require large amounts of temporary file space. Ingres lets you designate a separate storage device as the default location for these files.

When choosing the II_WORK location, be aware that temporary files tend to increase fragmentation on storage devices, which can lead to decreased performance. For this reason, you should assign II_WORK to a physical device which does not contain database, checkpoint, journal, or dump files, if possible. Your choice of the default work location does not affect your ability to recover lost data in the event of a storage device failure, although it may affect performance.

Press RETURN to continue:<Return>

Please enter the default location for your Ingres work files.
II_WORK: II_DB_LOC:

Creating II_DB_LOC:[ingres.work] ...

Ingres Transaction Log Locations

The Ingres DBMS uses a transaction log file to store uncommitted transactions and buffer committed transactions before they are written to the database file location(s).

In order to guarantee that no committed transactions can be lost in the event of a single storage device failure, a backup of the Ingres transaction log must be maintained on a storage device which is independent of the primary transaction log file device.

By default, Ingres will maintain a backup of the primary transaction log file on a storage location which you select.

You have the option of disabling the backup transaction log file, although you should only do so if the location you intend to use for your primary transaction log file has built-in fault tolerance (e.g. a fault-tolerant disk array or "mirrored" disk sub-system).

Press RETURN to continue:<Return>

Do you want to disable the backup transaction log? (y/n) **y**

You must verify that the location(s) you intend to select for the Ingres transaction log(s) have sufficient disk space. The default transaction log size for Ingres is:

32768 blocks (16MB)

Press RETURN to continue:<Return>

Do you want to change transaction log size? (y/n) **n**

Please enter a location for the primary Ingres transaction log.

II_LOG_FILE: II_DB_LOC:

Configuring primary transaction log location...

Creating II_DB_LOC:[ingres.log] ...

You must now specify the time zone this installation is located in. To specify a time zone, you must first select the region of the world this installation is located in. You will then be prompted with a list of the time zones in that region.

This setting must be assigned one of the following values:

AFRICA
ASIA
AUSTRALIA
MIDDLE-EAST
NORTH-AMERICA
NORTH-ATLANTIC
SOUTH-AMERICA

SOUTH-PACIFIC
SOUTHEAST-ASIA
GMT-OFFSET

Please enter one of the named regions: NORTH-AMERICA

If you have selected the wrong region, press RETURN for another chance.

This setting must be assigned one of the following values:

NA-PACIFIC
NA-MOUNTAIN
NA-CENTRAL
NA-EASTERN
CANADA-ATLANTIC
CANADA-NEWFOUNDLAND
CANADA-YUKON
MEXICO-GENERAL
MEXICO-BAJANORTE
MEXICO-BAJASUR
US-ALASKA

Please enter a valid time zone: **NA-EASTERN**

The time zone you have selected is:

NA-EASTERN (North American Eastern Time Zone)

If this is not the correct time zone, you will be given the opportunity to select another region.

Is this time zone correct? (y/n) **y**

Ingres supports different character sets. You must now enter the character set you want to use with this Ingres installation.

IMPORTANT NOTE: You will be unable to change character sets once you make your selection. If you are unsure of which character set to use, exit this program and refer to the Ingres Getting Started Guide.

This setting must be assigned one of the following values:

DECMULTI
ALT
ARABIC
CW
DOSASMO
ELOT437
GREEK

Do you want Ingres to comply with this standard? (y/n) n

Starting the Ingres server to initialize system catalogs..

Ingres/ingstart

Setting privileges...

("OPER")
("SYSNAM")
("SYSPRV")
("WORLD")
("PRMMBX")
("SHARE")
("READALL")
("SYSLCK")
("EXQUOTA")
("SYSGBL")
("PRMGBL")

Checking node SERVER1 for system resource required to run Ingres...

Your system has sufficient resources to run Ingres.

Starting your Ingres installation...

Defining logicals...

(LNM\$GROUP)

"II_APILIB" = "ii_system:[ingres.library]apifelibDB.exe"
"II_C_COMPILER" = "DECC"
"II_CHARSETDB" = "DECMULTI"
"II_COMPATLIB" = "ii_system:[ingres.library]clfelibDB.exe"
"II_CONFIG" = "II_SYSTEM:[INGRES.FILES]"
"II_DBMS_CONFIG" = "II_SYSTEM:[INGRES.FILES]"
"II_FRAMELIB" = "ii_system:[ingres.library]framefelibDB.exe"
"II_GCNDL_LCL_VNODE" = "server1"
"II_INSTALLATION" = "DB"
"II_INTERPLIB" = "ii_system:[ingres.library]interpfelibDB.exe"
"II_LIBQLIB" = "ii_system:[ingres.library]libqfelibDB.exe"
"II_LOG_FILE_NAME" = "ingres_log.l01"
"II_TEMPORARY" = "SYS\$SCRATCH"
"II_TIMEZONE_NAME" = "NA-EASTERN"
"TERM_INGRES" = "vt200"

Starting the Name Server...

```
Server process id = 22e0175c : Server Name = II_GCN_DB

Starting the Recovery Server...

Server process id = 22e0175d : Server Name = II_IUSV_DB_175D

The Ingres Logging System is active.

Waiting for the Logging System to go online...

Starting the Archiver Process...

%RUN-S-PROC_ID, identification of created process is 22E0155E

Starting DBMS Server (default)...

Server process id = 22e0175f : Server Name = II_DBMS_DB_175F

Ingres installation successfully started.

Initializing the Ingres system catalogs (creating database 'iidbdb')...

Creating database 'iidbdb' . . .

    Creating DBMS System Catalogs . . .
    Modifying DBMS System Catalogs . . .
    Creating Database Database System Catalogs . . .
    Modifying Database Database System Catalogs . . .
    Creating Standard Catalog Interface . . .
    Creating Front-end System Catalogs . . .

Creation of database 'iidbdb' completed successfully.

Checkpointing the Ingres system catalogs...
25-JAN-2006 10:20:32 CPP: Preparing to checkpoint database: iidbdb
beginning checkpoint to disk II_DB_LOC:[INGRES.CKP.IIDBDB] of 1 locations

25-JAN-2006 10:20:36 CPP: Start checkpoint of location: ii_database to disk:
    path = 'II_DB_LOC:[INGRES.CKP.IIDBDB]'
    file = 'c0001001.ckp'
executing checkpoint to disk
ending checkpoint to disk II_DB_LOC:[INGRES.CKP.IIDBDB] of 1 locations

done with checkpoint to disk
```

```
Creating database 'imadb' . . .  
  
    Creating DBMS System Catalogs . . .  
    Modifying DBMS System Catalogs . . .  
    Creating Standard Catalog Interface . . .  
  
Creation of database 'imadb' completed successfully.  
  
Initializing imadb for vdba...  
  
Initializing imadb for rmcmd...  
  
Shutting down the Ingres server...  
  
There are no RMCMD servers (rmcmd) running.  
There are no Star servers (iistar) running.  
There are no RMS servers (iirMS) running.  
Shutting down DBMS server II_DBMS_DB_175F...  
Waiting for process to exit...  
Process II_DBMS_DB_175F has exited.  
There are no JDBC servers (iijdbc) running.  
There are no Net servers (iigcc) running.  
There are no Bridge servers (iigcb) running.  
Shutting down the recovery server and archiver process...  
Waiting for processes to exit...  
The recovery server and archiver process have exited.  
Shutting down name server II_GCN_DB...  
Ingres DBMS setup complete.  
  
Refer to the Ingres Getting Started Guide for information about  
starting and using Ingres.  
  
II_SYSTEM: [INGRES.UTILITY]IISUDBMS.COM completed.
```

This procedure will set up the Ingres DBMS for networking.
In the course of this process you will be asked many questions
that help configure the installation.

Alternatively, you may choose the EXPRESS option which will result
in as few questions as possible; where feasible, defaults will be chosen.

Do you wish to choose the EXPRESS option? (y/n) **n**
Setting up Ingres Networking...

This procedure will set up the following version of Ingres Networking:

II 9.0.4 (axm.vms/100)

to run on local node:

SERVER1

The Ingres DBMS has been set up on this node; therefore, this installation
has the capacity to act as an Ingres "server", which means it can service
queries on local Ingres databases. An Ingres server can also service
remote queries if Ingres Networking is installed.

If you do not need to access this Ingres server from other nodes,
then you do not need to set up Ingres Networking.

Do you wish to continue this setup procedure? (y/n) **y**

Generating default configuration...

II_INSTALLATION configured as DB.

Configuring Net server listen addresses...

Ingres Networking has been successfully set up for this installation.

Note that you must use the "netutil" program to authorize users for access
to remote INGRES installations. If you need more information about Ingres
Networking authorization, please refer to the Ingres Net User Guide.

You can now use the "ingstart" command to start your Ingres server. If
you have not already done so, please execute the command procedure
"@II_SYSTEM:[INGRES]INGSYSDEF.COM" before you execute ingstart.

Refer to the Ingres Getting Started Guide for more information about
starting and using Ingres.

II_SYSTEM:[INGRES.UTILITY]IISUNET.COM completed.

You can now use the "ingstart" command to start your Ingres servers. Refer to the Ingres Getting Started Guide for more information about starting and using Ingres.

Also, following scripts have been provided to setup Ingres symbols:

II_SYSTEM:[INGRES]INGSYSDEF.COM : defines Ingres sysadmin symbols

II_SYSTEM:[INGRES]INGDBADEF.COM : defines Ingres DBA symbols

II_SYSTEM:[INGRES]INGUSRDEF.COM : defines Ingres user symbols

Installation of INGRES_9041 V0.A completed at 16:34

Adding history entry in VMI\$ROOT:[SYSUPD]VMSINSTAL.HISTORY

Creating installation data file: VMI\$ROOT:[SYSUPD]INGRES_904100A.VMI_DATA

VMSINSTAL procedure done at 10:40

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