



# Understanding the Oracle8i™ Internet File System (iFS) Option™

*Features Overview*

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## **PRODUCT SUMMARY**

Oracle *iFS* Option combines the power of Oracle8i with the ease of use of a file system. Running inside Oracle8i, the *iFS* is a Java application that runs against Oracle Java. The Oracle *iFS* leverages other Oracle8i features, such as objects, the ConText® cartridge, and Oracle® Enterprise Manager. This tight integration with Oracle8i provides the scalability, performance, security, and portability of the server itself.

From the end user's standpoint, however, *iFS* appears as if it were just another volume on the network. Whether the user accesses the contents of the *iFS* through Windows Explorer, a Web browser, an FTP client, or an e-mail client, the files appear the same. Relational data can appear as files; so too can hybrid documents that combine relational and non-relational data.

From a developer's standpoint, the *iFS* is the single data store containing the data for many different applications. And, for the system administrator, the *iFS* provides a single system for file storage and messaging, rather than several separate systems to maintain and administer. In short, *iFS* is a simpler way of storing different types of files in the database.

Oracle *iFS* has several key features beyond simple file storage that provide benefits for end users, application developers, and system administrators.

### **Universal Access**

While the *iFS* runs within Oracle8i, it appears as if it were simply another file system volume on the network. Oracle *iFS* can be accessed using several different protocols:

- *SMB* - Use this protocol to access the *iFS* through Microsoft Windows 95, Windows NT, and Windows 98 clients. Users can drag files into and out of the *iFS*, or edit them directly within the *iFS*.
- *HTTP* - Use this protocol to access the *iFS* with Web browsers and network computers.
- *FTP* - Use this protocol to see contents of the *iFS* with command-line and FTP clients. The contents of the *iFS* are displayed as standard FTP directories and use GET and PUT commands to move files.
- *SMTP*, *IMAP4*, *POP3* - Use these popular e-mail protocols to access the *iFS* through clients like Eudora, Microsoft Outlook, and others.

## Flexible Foldering

To make the *iFS* appear as a mounted network drive, the *iFS* organizes its contents into folders. When viewing the *iFS* from any type of client, these folders appear the way any folder or directory should. For example, from Windows clients, the *iFS* appears as a collection of folders and subfolders within the *iFS* volume. From e-mail clients, the *iFS* appears as a set of e-mail folders through which the user can easily browse, create, rename, and delete folders.

However, *iFS* folders have additional features not found on standard file system directories. Users can store relational and non-relational data in the same folder (relational data can appear as if it were a file), as well as construct documents that merge relational and non-relational data and then appear as files. Additionally, one file, an e-mail for example, can belong to multiple parents within the document hierarchy. While the e-mail may appear in the Marketing Initiatives folder, it might also appear in the Sales Resources folder. Multiple parents complement the standard drill-down capabilities of folder hierarchies with drill-up capabilities.

## *iFS* Messaging

The *iFS* can run an e-mail server as a daemon within Oracle8*i*. This feature bases the e-mail server on a high-performance and scalable platform, and lets users forward and reply to files as if they were e-mails.

And, of interest to application developers is the ability to automatically generate e-mail whenever particular events occur. For example, applications can be created that send an e-mail to a project leader whenever a team member updates the product schedule.

## Programming APIs

Developers writing applications based on the *iFS* can use three different APIs:

- Java
- CORBA
- PL/SQL™

Experienced Oracle database application developers can use PL/SQL, while other types of developers who may or may not have written database applications before can use Java or CORBA.

Whatever the API, the *iFS* provides the same set of hooks into objects, events, and processes within the Oracle *iFS*.

## END-TO-END JAVA SOLUTIONS

If a developer prefers using Java, the *iFS* makes it possible both to build end-to-end Java applications based in Oracle8*i* using the Java API and to write database-stored procedures in Java. With Oracle8*i*, developers can use enterprise Java beans (EJBs) as server application components and write client components in Java as well.

The *iFS* also includes its own Java Web server, capable of generating Java server pages (JSPs) within thin clients like browsers and network computers. The Java Web server component enables building greater interactivity and logic into the application components than is possible through static, stateless Web pages.

## **Extensible Document Classes**

The *iFS* organizes its contents into several different classes, which can be subclassed as needed. For example, spreadsheets containing confidential information can be handled differently than spreadsheets containing phone numbers and to-do lists by simply creating a separate document subclass for financial spreadsheets. When writing applications against the database file system, identify the document subclass for financial spreadsheets and handle them differently than other documents.

## **Advanced Searches**

Because the *iFS* runs within Oracle8i, it provides the same sophisticated search capabilities possible within a relational database. From both Windows and Web clients, end users can search both the attributes and the contents of documents. Developers can also leverage these features when building report writers and other applications.

## **Indexing and Metadata**

To enable advanced searches, the *iFS* automatically generates metadata about documents inserted or updated. Some of the metadata mirrors the “external” characteristics of the document: the date created, the date last saved, and the file format, among others. Other metadata comes from the internal contents of the document, such as titles and keywords found within a Microsoft Word file.

For many documents, the *iFS* uses the ConText option within the Oracle database to parse the document, discover underlying themes, and generate keywords. The *iFS* simultaneously adds index entries for external attributes of the document as needed. The *iFS* then stores the keywords in a master index to facilitate searches. In the case of XML documents, the *iFS* reads attributes coded into the structure of the XML document itself as potential index entries.

When users and applications perform searches against the *iFS*, they use the index created by the metadata read from documents. This technique is much faster than reading document properties directly, and faster still than scanning the contents of the file for each search.

## **Parsers and Renderers**

When placing a document in the *iFS*, the system can decompose (or parse) the document automatically. When someone needs to view the document, the *iFS* can recompose (or render) the document in whatever fashion the application developer directs. Parsing and rendering helps create custom views of the same document, showing different ranges of information, or perhaps the same information in different file formats.

## **ADMINISTRATION AND SECURITY**

The *iFS* is administered through Oracle Enterprise Manager, the same administrative tool used to manage the Oracle server. Administrators have the general system and security management features of the Oracle8i server, as well as additional options specific to the *iFS*. In addition, administrators can import group lists from other applications and back up the *iFS* with the same ease as backing up the database. All of these features make administration seamless with Oracle8i and other products.

Security and privileges are based on an access control list (ACL) model. The administrator assigns privileges such as update, delete, and other operations within specific folders. While users originally inherit privileges from the groups to which they belong, administrators can override these settings by assigning a new ACL to an individual user.

### **XML Support**

Since the Oracle *iFS* provides document parsing, rendering, and indexing, the *iFS* provides important support for XML. This structured format, gaining increasing acceptance in the application development and database markets, provides an elegant way to store attributes of the entire document as well as document sections. For several key operations, such as variable document rendering and automatic generation of index keywords, XML support provides significant power to the Oracle *iFS*.

### **Check In, Check Out (CICO)**

Basic file CICO features are implemented in the *iFS*, locking documents that have been checked out until they are explicitly checked it back in (or an administrator releases the lock).

### **Versioning**

When copying a file from the *iFS* to a client, or when editing it directly within the *iFS*, a new version of that file can be created. An administrator can also identify one particular version as the “official” version, making all others hidden from most users.

### **Change Notification**

When inserting, updating, or deleting a file, the *iFS* can generate an e-mail notifying one or more other users of the change.

### **Automatic Expiration**

The *iFS* can be configured to purge files from a folder after some time has passed.

## KEY INTERNET FILE SYSTEM FEATURES

- Universal access
- Flexible foldering
- *iFS* messaging
- Programming APIs
- End-to-end Java solutions
- Advanced searches
- Indexing and metadata
- Parsing and rendering
- ACL-based security
- Integrated administration
- XML support
- Check in, check out (CICO)
- Versioning
- Change notification
- Automatic expiration

### Configurations

- Available in enterprise and developer versions of Oracle8*i*.
- Advanced search dependent on the *iMedia*<sup>™</sup> cartridge option.

## KEY ORACLE8*i* ENHANCEMENTS

### Functionality

- The *iFS* adds a file system that runs within Oracle8*i*. Beyond simply providing easier file storage in the database, the *iFS* provides a superior means for integrating relational and non-relational data, performing advanced searches, creating customized views of information, and developing many common types of applications.

### Management and Ease of Use

- End users benefit from universal access, advanced searching options, easier techniques for editing files stored in the database, and accessing relational and non-relational data. System administrators have a much simpler system to administer, scale, and back up.
- For developers, the *iFS* is a superior platform for building and maintaining document-centric applications—in other words, any application that:
  - Benefits from integrated storage of documents and relational data.
  - Leverages the built-in features of the *iFS*.
  - Combines different types of non-relational data, such as documents and e-mail.
  - Combines relational and non-relational data.
  - Needs to run on a variety of clients requiring different protocols, such as Windows-based and HTTP-based versions of the same client application.
  - Requires a simple but robust environment for rapid application development and easier maintenance.

### Performance

- Performance for file-centered operations is comparable to standard file systems. Advanced search capabilities are much faster than on file systems, especially when searching for the contents of documents.



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