



IBM DB2 Extenders

Technical Summary

DB2® Extenders™ can take your database applications beyond traditional numeric and character data to leverage images, video, voice and complex documents. And you can reference all of these data types together in one SQL query.

For example, consider an advertising agency that maintains a DB2 database of its advertisements. In the past, the agency stored business data about each advertisement, such as the name of the client and the project completion date. Now, with DB2 Extenders, the agency can also store multimedia content in the database, whether it is in image, audio or video format. It can also store the accompanying script for the advertisement along with the media content.



DB2 Extenders make it easy to bring this information together on demand. Say an account executive wants to see and hear all the print, video and broadcast ads the agency produced for a particular client in 1998. One SQL statement in an application program delivers it all. The query can even use a powerful search engine to search for ad scripts that contain specific words or phrases, or their synonyms and variations.

DB2 Extenders define new data types and functions for images using the support for user-defined types and user-defined functions built into DB2 Universal Database™ for OS/390® Version 6. They also exploit the support for large objects of up to two gigabytes, and use DB2 triggers to provide integrity checks across database tables, ensuring the referential integrity of multimedia data.

The family of DB2 Extenders comprises:

- *DB2 Text Extender*

- *DB2 Image Extender*
 - *DB2 Video Extender*
 - *DB2 Audio Extender*
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DB2 Text Extender

Are you looking for a fast, versatile and intelligent full-text retrieval and mining tool? DB2 Text Extender is what you need. DB2 Text Extender gives you a powerful way to search for and extract key information from documents stored in DB2 Universal Database and also in files outside the control of DB2.

DB2 Text Extender can search through thousands of documents at high speed. It can access text documents such as word-processing documents and documents in a variety of languages, including double-byte-character-set (DBCS) languages such as Japanese. With DB2 Text Extender you can:

- Search for documents that contain a specific word, such as "Internet," or phrase, such as "large object."
- Search for documents that contain similar-sounding words.
- Make a "fuzzy" search to find words that are spelled in a similar way to the search term.
- Make a free-text search, that is, describe the subject to be searched as a natural-language phrase or sentence.
- Search for documents that contain synonyms of a word or phrase. For example, search for documents that contain the word "book" and also find documents that contain "article," "volume," "manual" and other synonyms.
- Search for documents that contain words in any sequence, or words in the same sentence or paragraph. For example, search for the word "compress" in the same paragraph as the word "encryption."
- Perform wildcard searches using word and character masking. For example, search for documents that contain words that begin with the characters "net" or phrases that end with the word "media."
- Search for documents by variations of a word, such as its plural form or the word in a different tense. For example, search for documents that contain the word "drive" and also find documents that contain "driving," "drove" and "driven."
- Build your own thesaurus to automatically expand search terms to include others having a particular relationship to the search term. For example, search for "database" and also find documents that contain "repository" and "DB2." This type of search is intended for specific areas of interest in which you make frequent searches.

At the heart of DB2 Text Extender is IBM's powerful text mining technology. This technology underlies sophisticated text analysis features such as:

- Extracting document terms that can be stored and used to expand a search term. A search for "Clinton," for example, could be expanded to search for "president." DB2 Text Extender discovers the relationship between such words by analyzing the documents. Three feature extraction processes are provided—proper-name extraction, domain-term extraction and abbreviation extraction.
- Recognizing terms that contain non-alphanumeric characters. DB2 Text Extender recognizes terms such as "don't" or "\$14,225."
- Normalizing terms to a standard form. Normalizing reduces mixed-case terms and terms containing accented or special characters to a standard form. This enables you to search for documents that contain "computer" and also find "Computer" or "multi-media" and also "multimedia."

- Reducing terms to their base form. Terms such as "media" are reduced to their base form "medium." Conjugated verbs such as "bought" are reduced to their infinitive "buy". This lets you search for documents that contain a word and its variations.
- Decomposing terms. Languages such as German and Dutch are rich in compound terms such as "Versandetiketten," which means "mail (Versand) labels (Etiketten)." These compound words are split into their components, allowing you to search for documents that contain a compound word or its components.

Using DB2 Text Extender, you can integrate your text search with business data queries. For example, within an application you can use DB2 Text Extender to query a database for text documents created by a specific author within a range of dates that contain a particular word or phrase. Then you can use DB2 Text Extender to browse the documents.

DB2 Image Extender

When was the last time you saw pictures with your business data? With DB2 Image Extender you can store and query images in a DB2 database just as easily as you can traditional data. Then, you can bring together the images and related business data through one SQL query to create innovative applications.

DB2 Image Extender supports a wide variety of image formats, such as GIF, JPEG, BMP and TIFF. With DB2 Image Extender, your applications can:

- Import and export images and their attributes into and out of a database. When you import an image, DB2 Image Extender stores and maintains image attributes such as size in bytes, format, height, width and number of colors.
- Control access to images with the same level of protection as traditional business data.
- Convert the format of images. You have the flexibility of importing or exporting an image in its source format or converting the format of the image when importing or exporting. You can also scale an image, rotate it, do black-white image inversion or change representational characteristics such as bits per sample and compression type.
- Secure and recover images. Images and their attributes that you store in a DB2 database are afforded the same security and recovery protection as traditional business data.
- Query images based on related business data or by image attributes. You can search for images based on data that you maintain, such as a name, number or description; or by data that the DB2 Image Extender maintains, such as the format of the image or its distribution of colors.
- Generate and display image thumbnails and full images. A thumbnail is a miniature version of an image. When you import an image into a database, DB2 Image Extender creates and stores a thumbnail of the image. You can use DB2 Image Extender to retrieve a thumbnail or a full-size image, invoking your favorite Web browser to display the image.

Using DB2 Image Extender you can integrate image data and traditional business data in the same query. For example, within an application, you can query a photographic database for thumbnail images of all pictures stored in GIF format, and list the names of each picture's photographer. Then DB2 Image Extender can invoke your Web browser, allowing you to view both the image and the related information.

But that's not all. With DB2 Image Extender's Query by Image Content (QBIC®) technology, you can search for images easily. QBIC lets you use visual examples of colors or texture patterns as search criteria. Imagine if you were looking for an ad that had a particular color or pattern. How would you find it in the database? Select a color or texture example and submit

it in your query. The DB2 Image Extender will find the images whose visual characteristics are closest to the examples you choose. You can also specify QBIC query criteria such as the value of a color and a texture-in a character string.



DB2 Image Extender finds images based on characteristics such as color or texture.

There are numerous new applications you can create with QBIC technology. Here are a few examples:

- A fashion application that allows a sales representative or a customer to search for accessories that match the color of a garment
- An online art catalog that allows art teachers or historians to search for paintings that have a particular texture
- A clip art service that allows clients to select graphics based on a particular pattern, such as the vertical slats of a fence or the concentric arcs of a rainbow.

DB2 Video Extender

When was the last time you saw video with your business data? With the DB2 Video Extender you can store and query video data in a database just as easily as you can traditional data. And, you can bring video and related business data together in one SQL query.

DB2 Video Extender supports a variety of video file formats and can work with different file-based video servers. With DB2 Video Extender, your applications can:

- Import and export video clips and their attributes into and out of a database. When you import a video clip, DB2 Video Extender stores and maintains video attributes such as frame rate, compression format and number of video tracks.
- Secure and recover video data. Video clips and their attributes stored in DB2 are afforded the same security and recovery protection as traditional business data. You can query video clips based on related business data or by audio attributes. You can search for video clips based on data that you maintain, such as a name, number or description, or by data that DB2 Video Extender maintains,

such as the format of the video or the date and time that it was last updated.

- Play video clips. You can use DB2 Video Extender to retrieve a video clip. You can then use DB2 Video Extender to invoke your favorite video browser to play the video clip.

Using DB2 Video Extender, you can integrate video data and traditional business data in a query. For example, you can query a news database for video news clips about a specific subject and list the playing time of each video clip. Then you could use DB2 Video Extender to play the video clips.

You can also use DB2 Video Extender to automatically segment a video clip into shots based on scene changes. A scene change is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when the camera recording a video changes its point of view. The frames between two scene changes constitute a shot.

When DB2 Video Extender detects a scene change, it records data for the associated shot. This includes the starting and ending frame number of the shot and the content of representative frames within the shot. You can use this data to find specific shots or frames. You can also store this data in a database and join it with related data.

DB2 Audio Extender

When was the last time you heard sound with your business data? With DB2 Audio Extender you can store and query audio data in a database, and combine it with related business data in a single SQL query.

DB2 Audio Extender supports a variety of audio file formats, such as WAVE and MIDI, and can work with different file-based audio servers. With DB2 Audio Extender, your applications can:

- Import and export audio clips and their attributes into and out of a database. When you import an audio clip, DB2 Audio Extender stores and maintains audio attributes such as number of audio channels, transfer time and sampling rate.
- Secure and recover audio data. Audio clips and their attributes that you store in a DB2 database are afforded the same security and recovery protection as traditional business data. Query audio clips based on related business data or by audio attributes. You can search for audio clips based on data that you maintain, such as a name, number or description, or by data that DB2 Audio Extender maintains, such as the format of the audio or the date and time that it was last updated.
- Play audio clips. You can use DB2 Audio Extender to retrieve an audio clip. You can then use DB2 Audio Extender to invoke your favorite audio browser to play the audio clip.

Using DB2 Audio Extender, you can integrate audio data and traditional business data in a query. For example, you can query a music database for audio recordings by a particular recording artist and list the date of each recording. Then you can use DB2 Audio Extender to play the audio clips.

DB2 Extenders and distributed applications

DB2 Extenders exploit the client/server distributed application model. DB2 Extenders work with IBM DB2 Universal Database for OS/390 Server Version 6 (or higher). DB2 Extenders also support IBM DB2 Universal Database Version 5 (or higher) on the following Intel and Unix platforms: IBM OS/2®, Microsoft® Windows NT®, IBM AIX®, Solaris Operating

Environment™, and HP-UX.

Client platforms include OS/2, Windows® 3.1, Windows 95, Windows NT, AIX, Sun's Solaris Operating Environment, HP-UX as well as OS/390 Open Edition clients.

Obtaining DB2 Extenders

DB2 Extenders are among the several features and tools offered with DB2 Universal Database Server for OS/390 Version 6:

- [DB2 Administration Tool](#)
- [DB2 Buffer Pool Tool](#)
- [DB2 DataPropagator™](#)
- DB2 Extenders™
- DB2 Management Tools Package
 - [DB2 Control Center](#)
 - [DB2 Estimator](#)
 - [DB2 Installer](#)
 - [DB2 Visual Explain](#)
- [DB2 Performance Monitor](#)
- [DB2 Utilities](#)
- [Net.Data®](#)
- [QMF Family](#)
- [QMF for Windows](#)
- [QMF High Performance Option](#)

DB2 Extenders are also included with DB2 Universal Database Version 6.1 for UNIX, Windows NT and OS/2.

Connecting to DB2

[IBM DB2 Connect™](#) enables remote access to data stored in DB2 Universal Database for OS/390 from UNIX®, Windows and OS/2 applications.

To find out more

If you'd like to learn more about DB2 Extenders, contact your IBM marketing representative or visit our Website at <http://www.ibm.com/software/db2/extenders>

To download DB2 Extenders, visit www.ibm.com/software/db2/extenders



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