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If the requested start time is past the actual database end time, then there are no columns available for the requested time frame, so return "zero columns bound".

If the requested direction is "older" (reverse chronological order—requested time is end time) 5

If the requested end time is after the actual database end time, set the requested end time to the actual database end time.

If the requested end time is before the actual database start time, then there are no columns available for the requested time frame, so return "zero columns bound" 10

Define the bind set boundaries, count the columns in the bind set, and save the times of the columns bound 15

If only one time was specified

If there are columns in the bind set

Set the bind set end time in the RD to the time of the last column in the bind set.

Else 20

Set the bind set end time in the RD to the bind set start time in the RD to indicate that there are no columns in the bind set

If the requested direction is "older"

Swap the start and end bind set times in the RD so that start time is less than end time. 25

Build the row list for the bound time range

Return the number of columns in the bind set.

APPENDIX C

Build Row List

Free the row descriptor's current row list (if there is one).

Set the row descriptor start and end times to the start and end times of what is actually in the database. 35

If the bind range of the indexed-matrix rows is outside of the actual database time range, then there are no rows to build—return.

For each indexed-matrix object definition in the row descriptor do 40

Find the first page in memory whose time range is part of the bind set and get the column number within the page of the time closest to the start time of the bind set.

Try to find the last page of times in the bind set. 45

Start with the first page whose time range is part of the bind set—while there are more pages whose time ranges are part of the bind set do

For each row on the page that matches the current object definition do 50

Get the address of the row header in the data space using the OCHI index.

If either the row start time or end time are in the bind set, add the row to the end of the row descriptor's row list. 55

Get the next page with times in the bind set (if any remain).

APPENDIX D

Bind Columns

While within the requested time range (if specified) AND the next time to bind (based on highest row density) will not fill all available columns in the bind set AND the next time to bind (based on highest density) is within the database time range do 65

For each object definition in RD that is indexed-matrix do

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If the density of the object is more than that of all previous objects, save the density.

Get the page number within the block, and the column number within the page of the time to include in the bind set.

Get the Object Class Hierarchy Index (OCHI) and I-indexes and the data for the page.

Find the first entry in the OCHI index for the object definition.

If the object is not in the OCHI index for this page, then it has no data in the page's time range—move on the next object (go to the top of the for loop).

For each row on the page with the current object definition do

Get the address of the row in the data space for the page (using the OCHI index).

Get the offset into the data space of the cell header within the row.

If the cell header offset is not valid, there is no data on this page on this row for this particular column—do the next row.

If the requested direction is "older"

Go to the end of the cell chain to prepare to traverse it backwards—note that the cell chain includes cells with times for the current cell up to, but not including, the time for the next regular cell for the density.

While there are more cells in the cell chain and there is room in the bind set for more columns do

Save the cell time in the bind set.

Get the next cell (in the proper direction) on the cell chain.

APPENDIX E

Get an Object Instance or Correction Cell

If no objects are defined for the row descriptor Don't continue—this is an error condition.

If the requested cell time is outside of the RD bind set time range 40

Return a null value—issue a warning.

Get the page within the block, and the column within the page of the requested cell

From the page's I-index, get the offset into the data space of the row that contains the cell. 45

Get the cell offset from the row.

If the cell offset is not valid

There is no data for the requested cell, so return a null value.

While the cell time is not the same as the requested time and there are more cells on the chain do

Go to the next cell on the cell chain.

If there are no more cells on the cell chain

There is no data for the requested cell, so return a null value.

If a corrected value was requested

Follow the cell's correction chain to the requested depth.

If the end of the correction chain is reached before the requested depth 60

There is no correction cell at the requested depth for this time so return a null value.

Return a pointer to the cell found.

We claim:

1. In a computer system having input means for inputting data and commands into said system by a system user, display means for displaying information to said user, a memory for storing data and instructions, includ-