Using the Buffer Pool Monitor (NATBPMON)

This chapter covers the following topics:

- Invoking the NATBPMON Utility

- NATBPMON Commands

- Displaying the Objects in the Buffer Pool

- Specifying a Pattern

- Displaying the Buffer Pool Settings

- Statistical Information About the Buffer Pool

See also *Natural Buffer Pool* which provides general information on the buffer pool and explains how to start the buffer pool.

> ⚠ **Warning:**
> **This utility should not be generally accessible to all users of Natural, because its use can cause damage to the work of other users of the buffer pool.**

Invoking the NATBPMON Utility

You can invoke the NATBPMON utility either for the default buffer pool NATBP or for another existing buffer pool.

▶ **To invoke the NATBPMON utility**

1. If the default buffer pool NATBP is to be used, enter the following command in the command line:

   ```
   NATBPMON
   ```

   Or:
   If another buffer pool is to be used, enter the following command in the command line:

   ```
   NATBPMON BP=buffer-pool-name
   ```

   The following prompt appears:

```
NATBPMON>
```

NATBPMON Commands

The following commands can be entered at the NATBPMON prompt:

Command	Description
CLEAR	This is the same as the ZERO command.
CORPSES	Displays the list of corpses. A corpse is an object that has been deleted, but was still being used in the buffer pool when its deletion took place. Once this object is no longer used, it will automatically disappear from the list of corpses. **Note:** The column **cusr** which is shown with the DIR command indicates if an object is being used.
DELETE {*pattern*|[*]}	Deletes an object from the buffer pool. All objects can be deleted from the buffer pool by using an asterisk (*). A pattern is used to specify a collection of objects, similar to current operating systems which allow the specification of a class of files with wildcards. For further information, see *Specifying a Pattern*.
DIR {*pattern*|[*]}	Displays a directory containing all objects in the buffer pool. For further information, see the sections *Specifying a Pattern* and *Displaying the Objects in the Buffer Pool*.
DUMP	Used for error analysis. **Important:** Do not use this command unless you are requested to do so by Software AG Support.
EXIT	Exits the NATBPMON utility.
FIN	Exits the NATBPMON utility. This is the same as the EXIT command.
HELP	Displays a list of all available commands of the NATBPMON utility.
IPCRM	Frees the resources allocated to the buffer pool. This command should only be used following a SHUTDOWN command when there are no active users.
KILL *n*	Kills the specified buffer pool user. *n* is the number of the user to be "killed". This number corresponds to the index number as displayed by the WHO command. This command is used to start the OpenVMS command STOP from within the NATBPMON utility in a safe way; that is, without the danger of destroying the internal data structure of the buffer pool.

Command	Description
PARAM	Displays the buffer pool settings. For further information, see *Displaying the Buffer Pool Settings*.
QUIT	Exits the NATBPMON utility. This is the same as the EXIT command.
SHUTDOWN [FORCE [*grace-period*]]	Without the option FORCE: Shuts down the buffer pool. No new processes will be able to use the buffer pool once this command has been issued. The NATBPMON utility is able to run with a buffer pool which has the shutdown status "pending"; all commands of the NATBPMON utility are available in this case. As soon as all users have stopped using the buffer pool, the buffer pool's resources can be deleted with the IPCRM command. The option FORCE requires NATBPMON to be executed with super user rights. After SUDO or SU has validated the password and given control to NATBPMON, any new sessions will be inhibited to log in and the terminate signal SIGTERM will be sent to all active Natural sessions. NATBPMON will then wait the number of seconds defined with the parameter *grace-period* before the IPC resources used by the buffer pool are removed from the system. If the optional parameter *grace-period* is omitted (or set to 0), NATBPMON will wait until all processes performed their cleanup processing. This process can be considered as an emergency stop. If it is executed without super user rights, no action takes place and a message reporting the incapability to execute the command is sent. See also *Shutting Down and Restarting the Buffer Pool*. **Note:** To start the buffer pool after shutdown, you can use the utility NATBPSRV.
STATUS	Displays statistical information about the buffer pool. For further information, see *Statistical Information About the Buffer Pool*.
WHO	Displays a list of all users who are using the buffer pool. The following statistics are displayed: a number that the NATBPMON utility automatically assigns to each buffer pool user (index) and the user ID, terminal ID and process ID of the process using the buffer pool (tid).
WRITE	Writes a buffer pool object onto the disk. You are prompted to specify an index and a file name. **Note:** The column "indx" which is shown with the DIR command shows the index numbers.
ZERO	Resets to 0 all counters that are displayed by the STATUS command.

Displaying the Objects in the Buffer Pool

The DIR command displays a list of objects. This list contains the following information:

Column	Explanation
indx	A number that the NATBPMON utility automatically assigns to an object when it is loaded into the buffer pool.
cusr	The current number of users that are using an object in the buffer pool.
pusr	The peak number of concurrent activations of an object in the buffer pool.
nusg	The number of times an object has been activated in the buffer pool.
g	Specifies whether an object is being loaded into the buffer pool from the system file. Has one of the following values: 0 The object is not being loaded. 1 The object is being loaded.
size	Specifies the size (in bytes) of an object in the buffer pool.
gpv	The version number of the generated program.
key	Specifies the following information about an object: D Database ID. F File number. L The library in which the object is located. N The name of the object. Numbers and "@" indicate chunks of *FILEDIR.SAG* for the currently loaded library. K The kind of object ("G"=generated object module; "S"=source; "D"=part of *FILEDIR.SAG*). T The object type (which is blank when "D" is shown in the "K" field).

When the DIR command is issued, all objects in the pool will be displayed in a notation similar to the following:

```
indx:    index of the element
 cusr:    current number of concurrent users
 pusr:    peak number of concurrent users
 nusg:    number of usages
 g  :     set if object is generating
 gpv :    version of generated program

indx | cusr | pusr |  nusg  |  g  |  size  |  gpv  | key
-----+------+------+--------+----+--------+-------+------------------------------------------------
  1  |  0   |  1   |   4    |  0  |  920   |       | (D=99 F=101 L="DEMO" N="SEL-MAP" K='G' T='M')
  2  |  1   |  7   |   2    |  0  |  3096  |       | (D=99 F=101 L="DEMO" N="EMWND" K='G' T='P')
  3  |  4   |  9   |   4    |  0  |  604   |       | (D=99 F=101 L="DEMO" N="HDR" K='G' T='P')
  4  |  2   |  3   |   7    |  0  |  412   |       | (D=99 F=101 L="RPA" N="MMUPROG1" K='G' T='P')
  5  |  0   |  1   |   5    |  0  |  372   |       | (D=99 F=101 L="RPA" N="MMUPROG2" K='G' T='P')
  6  |  0   |  5   |   4    |  0  |  372   |       | (D=99 F=101 L="RPA" N="MMUPROG3" K='G' T='P')
```

Specifying a Pattern

A pattern can be specified with the commands DIR and DELETE. The examples in this section apply to the DIR command.

To select some objects, it is possible to restrict the values of certain key fields by specifying a matching pattern expression.

To restrict the allowed field values of a given field, the following pattern notation must be used:

name=expression

You can specify multiple patterns by separating them with a comma.

The specified patterns must all match their corresponding fields in order to accept the entire key.

The expression accepts the specification of the wildcard characters "*" and "?".

The character "*" matches any or no occurrences of a sequence of characters, and the wildcard character "?" matches exactly one specific character.

Examples

To select all objects of type "P" in the sample above, the following command would be used:

```
 DIR T=P
```

To select all programs in the demo library, the following command would be used:

```
 DIR T=P, L=DEMO
```

To select all objects containing an "M" in their name, the following command would be used:

```
 DIR N=*M*
```

Displaying the Buffer Pool Settings

The following settings are displayed with the PARAM command:

```
Active since ..............:  3-SEP-2007 13:50:01.35, Version 6.3(633)
Last time cleared .........:  3-SEP-2007 13:50:01.35

Bpid ......................: BPNATAN2
Systemwide ................: 1
Sfdelete ..................: 0
Lckresname ................: NATBPLCK631S_NATAN2
Gsdname ...................: NATBP631S_NATAN2
Sectionfile ...............: NATAN2$USER:[NATURAL_BP]NATBP631S_NATAN2.SEC
Memsize ...................:   10485760
Maxusers ..................:        200
```

Bpid	Buffer pool ID.
Shmkey	Unique name used to create a buffer pool or to connect to a buffer pool.
Semkey	Unique name used to synchronize accesses to the buffer pool memory.
Memsize	Size of the available shared memory.
Maxusers	Maximum number of users that can have simultaneous access to the buffer pool.

See *Buffer Pool Assignments* in the *Configuration Utility* documentation.

Statistical Information About the Buffer Pool

The following statistics are displayed with the STATUS command:

```
Active since ..............:  4-JAN-2007 10:16:52, Version 6.3(631)
Last time cleared .........:  4-JAN-2007 10:16:52
Bpid ......................: NATBP
Allocated memory (bytes) ..:   18207752 Max users ...............:         50
Smallest allocation .......:         32 Current users ...........:          5
Largest allocation ........:    4707272 Peak users ..............:          9
Free memory (bytes) .......:    2763768 Dead users purged .......:        623
Smallest free .............:        136
Largest free ..............:      33136

Dormant objects ...........:       2010 Smallest object (bytes) .:         15
Active objects ............:          1 Largest object (bytes) ..:      49383
Generating objects ........:          0 Total object sizes ......:   12394644
Obsolete objects ..........:          0

Attempted locates .........: 1646837910 Stored objects ..........:          0
Attempted fast locates ....:  823725223 Loaded objects ..........:    1520609
Successful fast locates ...:  822423506 Activated objects .......: 1645410434
Percent ...................:      99.84 Aborted loads ...........:     323104

Dormant objects purged ....:      51919 Peak parallel activations:          4
Object reusage factor .....:    1082.07
```

General Information	
Active since	Date and time when the buffer pool was started and the version number of the buffer pool.
Last time cleared	Date and time when the buffer pool was most recently cleared.
Bpid	Buffer pool ID.
Memory Allocation	
Allocated memory (bytes)	Total of all allocated memory.
Smallest allocatio	Smallest amount of allocated memory.
Largest allocation	Largest amount of allocated memory.
Free memory (bytes)	Total of all free memory.
Smallest free	Smallest amount of contiguous free memory.
Largest free	Largest amount of contiguous free memory.
User Statistics	
Max. users	Maximum number of users that can have simultaneous access to the buffer pool. See *Buffer Pool Assignments* in the *Configuration Utility* documentation.
Current users	Number of users currently using the buffer pool.
Peak users	Peak number of users that have been using the buffer pool.
Dead users purged	Number of inactive users that have been deleted from the buffer pool. This number should be close to 0 (zero). An increment of this number indicates that entries for buffer pool users (i.e. Natural sessions) were canceled or killed unconditionally. Each time an entry for such a user is identified by the buffer pool manager, this number is incremented and cleanup is performed to remove residuals which have been left in the buffer pool by a canceled session.
Object Use Statistics	
Dormant objects	Number of available, but inactive objects. These objects are in the buffer pool, but are not being used. They are available for later use and will become active objects as soon as a buffer pool user requests their availability.
Active objects	Number of active objects. These objects are currently in use by one or more buffer pool users.
Generating objects	Number of objects that are currently being loaded into the buffer pool. These objects will become available as soon as the load operation completes.

Obsolete objects	Number of objects that are to be deleted from the buffer pool, but are still being used. These objects can be displayed by using the CORPSES command. An obsolete object is removed from the buffer pool as soon as all users who activated this object have released this object. In a production environment, this number should be 0 (zero). A value other than zero indicates that objects were deleted either using the DELETE command of NATBPMON or became obsolete because new objects were created (for example, due to a CATALOG command).
Object Size Statistics	
Smallest object (bytes)	Size of smallest object in the buffer pool.
Largest object (bytes)	Size of largest object in the buffer pool.
Total object sizes	Total size of all objects in the buffer pool.
Locate Statistics	
Attempted locates	Number of successful and failed object locates. This number tells you how many times the buffer pool manager was asked to locate an object in the buffer pool.
Attempted fast locates	Number of attempted activations with known slot. This is the number of object activations when the former location of an object was known. It is highly probable that an object can be found in the same place in the buffer pool when it is reactivated.
Successful fast locates	Number of successful fast locates.
Percent	Percentage of successful fast locates.
Object Loading Statistics	
Stored objects	The number of objects stored in the buffer pool. This is the number of objects that were stored into the buffer pool and which were not loaded from the system file.
Loaded objects	The number of objects loaded from the system file. Each time an object is not found in the buffer pool, it is loaded from the system file. This number is increased each time an object is successfully loaded into the buffer pool.
Activated objects	The number of activated objects. Activation is the process of marking an object which is found in the buffer pool as "in use" by a buffer pool user.
Aborted loads	The number of load operations that were aborted due to memory shortages within the buffer pool, or due to an error when loading an object into the buffer pool. This number should not vary in a noticeable way.
General Loading Statistics	
Dormant objects purged	The number of unused objects deleted from the buffer pool to make room for newly loaded ones.
Peak parallel activations	The maximum number of parallel activations of one of the objects in the buffer pool.

Object reusage factor	Average number of times an object was reactivated. This number is the ratio of the number of object activations to the number of objects loaded into the buffer pool.