

# Pillar Axiom Statistics Tools



## User's Guide

**ORACLE®**

PILLAR AXIOM

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## CHAPTER 1

# Introduction to Pillar Axiom System Statistics

## About Pillar Axiom System Statistics

The Pillar Axiom system collects statistics data on many facets of system operation. Each component of the Pillar Axiom system periodically collects key statistics covering such areas as filesystem read and write performance, block-level read and write performance, and error counts.

The Statistics Tools utilities make it possible to process and download any of these statistics from the Pillar Axiom graphical user interface (GUI) for analysis in statistical applications and spreadsheets.

Statistical data captured in a binary format on the Pillar Axiom system can be downloaded from the Collect System Information page in the Pillar Axiom Storage Services Manager (GUI) for processing on a client machine.

Application tools provided with the Pillar Axiom system make it possible to process this data into a format suitable for use by statistical applications or spreadsheets. In that format, the statistical data can be used to:

- Analyze the Pillar Axiom system to determine bottlenecks and determine what needs to be tuned in order to optimize performance.
- Track Pillar Axiom system load and capacity.
- Produce reports and graphs for presentation.
- Integrate with existing performance monitoring and reporting applications.

For example, aggregated statistics can help determine whether the system is being fully utilized. An analysis of these statistics could help determine sizing for future expansion of the system.

## Supported Platforms

The Pillar Axiom Statistics Tools are supported on the following platforms:

- Windows XP
- Windows Server 2003
- Windows Vista
- Windows 7
- Windows Server 2008
- Red Hat Enterprise Linux (RHEL) 5

## Audience

This guide is intended for administrators of Oracle's Pillar Axiom 600 systems, including system administrators and storage administrators, who need to analyze Pillar Axiom system statistics. The results of the analysis can be used to make system configuration and performance improvements.

We assume that you have the necessary skills and experience in:

- Computer hardware operation.
- Pillar Axiom storage system administration.
- Gathering storage system statistics.
- Analyzing storage system statistics.
- Linux or Windows architecture and usage.

## About the Statistics Tools

The Pillar Axiom storage system provides two application tools to assist in collecting and formatting the statistical data that you can use for analysis.

**Table 1 Statistics tools descriptions**

Tool	Executable name	Description
Pillar Axiom Statistics Parser	<code>axiomstatsparser</code>	A command line utility that runs on the client machine and translates the raw Pillar Axiom storage system statistics into an intermediate format. The intermediate format data is stored in a file on the client machine to provide quick access to the data in the subsequent analysis phase.
Pillar Axiom Statistics Formatter	<code>axiomstatsformatter</code>	A command line utility that runs on the client machine and reads Pillar Axiom storage system statistics from the intermediate format created by the Statistics Parser. The Statistics Formatter exports statistical data to comma-separated value (CSV) files that can be imported into spreadsheets and other applications for analysis.

Typically, you run the Pillar Axiom Statistics Parser tool once whenever you download a new statistics bundle from the Pillar Axiom system to parse this binary statistics bundle into an intermediate statistics file. You then run Pillar Axiom Statistics Formatter one or more times to generate one or more subsets of the data that tools like Microsoft Excel can read for analysis. To help you with your analysis, statistical data can be sorted by Pillar Axiom component, Slammer control unit name, or time range. See [Statistics Formatter Syntax](#) for a complete list of sorting options with examples.

## Pillar Axiom System Statistics Terms

Pillar Axiom system statistics are arranged by component, subcomponent, and statistics type.

Table 2 Statistics terms defined

Term	Description
Component	<p>A Pillar Axiom software module. A Pillar Axiom system contains many modules. These modules, together, define the architecture of the system. An example of a component is the Array Manager (AM), which provides storage pool virtualization functions. Each component maintains a collection of statistics. See the <code>axiomstatsdefinitions.html</code> file included in the statistics tools download for descriptions of the statistics included in each collection.</p> <p>The following software modules comprise the Pillar Axiom system:</p> <p><b>Module Description</b></p> <p><b>AM</b>     Array Manager.</p> <p>The Array Manager (AM) provides storage pool virtualization functions. It allows all data on Bricks to be treated as a single storage pool. The Array Manager handles logical unit (LUN) mapping to physical drive storage locations.</p> <p><b>Brick</b>    A 2U storage enclosure in a Pillar Axiom system. A Brick connects to one or more Slammers or to an upstream Brick in a string of Bricks. Taken together, all Brick connections form what is called the <i>Storage System Fabric</i> or more simply <i>SSF</i>. Bricks can be categorized as Fibre Channel (FC), serial ATA (SATA), or solid state drive (SSD).</p> <p><b>BS</b>        Block Services.</p> <p>Supplies all read and write cache management, including mirroring.</p>

Table 2 Statistics terms defined (continued)

Term	Description
	<p><b>Module Description</b></p> <p><b>CIFS</b> Common Internet File System. Provides Windows and other CIFS clients access to the Pillar Axiom filesystems by means of network shares.</p> <p><b>DMS</b> Diagnostic and Monitoring Services. Runs diagnostics and monitors various components of the system.</p> <p><b>DPS</b> Data Protection Services. Provides the functions necessary for backup services.</p> <p><b>MFS</b> Meta File System. Provides a protocol neutral file system that supports files, directories, and other filesystem objects.</p> <p><b>NFS</b> Network File System. Provides UNIX, Linux, and other NFS clients access to the Pillar Axiom filesystem by means of mount points.</p> <p><b>PI</b> Private Interconnect. Manages all data paths within the Storage System Fabric (SSF).</p> <p><b>SAN</b> Storage Area Network. Runs on SAN Slammers to provide the host network with a SCSI interface to the Pillar Axiom storage system LUNs.</p>

Table 2 Statistics terms defined (continued)

Term	Description
	<p><b>Module Description</b></p> <p><b>VS</b> Virtual Server</p> <p>Manages NAS-only File Servers that are used to assign security, network and protocol access attributes. These attributes apply to all filesystems associated with the File Server. Includes virtual interfaces (VIFs).</p>
Statistics bundle	The portion of the system information collection that contains statistical data.
Statistics column	A column heading in the statistics output that identifies a discrete statistic, such as <code>Write_through_Ops</code> (the number of write-through operations). These are the column headings used in the HTML output file <code>axiomstatsdefinitions.html</code> downloaded with the statistics tools.
Statistics type	<p>The type of statistical data. Each component can contain different types of data:</p> <p><b>Error</b> Error statistics count operations that have failed.</p> <p><b>UI</b> User interface statistics are user-visible statistics normally shown on the GUI.</p> <p><b>General</b> General statistics contain any detailed statistics that a component collects that cannot be classified as error or user visible statistics.</p>
Subcomponent	<p>A constituent part of a primary component. Subcomponents are also known as <i>resource types</i>.</p> <p>Some components have no subcomponents, while others have several. For example, the AM component has no</p>

**Table 2 Statistics terms defined (continued)**

Term	Description
	subcomponents, while the PI component has four: Node, Path, Port, and SW.

For a description of all component and subcomponent statistics, refer to the `axiomstatsdefinitions.html` file downloaded with the Pillar Axiom Statistics Parser and Pillar Axiom Statistics Formatter tools.

## Get Help with Pillar Axiom System Statistics

Use the `-h` option to display help for either the Pillar Axiom Statistics Parser or the Pillar Axiom Statistics Formatter tool. You can also display a list of available statistics and descriptions.

- 1 Log on to the client machine where you installed the statistics tools.
- 2 From a command line, choose one of:
  - Run `axiomstatsparser -h` to display a procedure for using the statistics tools, plus the syntax, command options, and examples for using the Pillar Axiom Statistics Parser tool.
  - Run `axiomstatsformatter -h` to display a procedure for using the statistics tools, plus the syntax, command options, and examples for using the Pillar Axiom Statistics Formatter tool.
  - To display a list of available statistics and their descriptions, open the `axiomstatsdefinitions.html` file included in the statistics tools download.

## Pillar Contacts

Table 3 Contacts at Pillar Data Systems

For help with...	Contact...
Error messages, usage questions, and other support issues	<p>US and Canada: 877-4PILLAR (1-877-474-5527)</p> <p>Europe: +800 PILLAR FS (+800 74 55 27 37)</p> <p>Asia Pacific: +1-408-518-4515</p> <p>South Africa: +0 800 980 400</p> <p>Have your system serial number ready.</p> <p><a href="mailto:support@pillardata.com">support@pillardata.com</a></p> <p><a href="http://support-portal.pillardata.com/csportal/login.seam">Pillar Customer Support (http://support-portal.pillardata.com/csportal/login.seam)</a></p>
Training (custom or packaged)	<a href="http://www.pillardata.com/support-education/training/">Training and Education (http://www.pillardata.com/support-education/training/)</a>
Professional services and inquiries	<p><a href="mailto:globalsolutions@pillardata.com">globalsolutions@pillardata.com</a></p> <p><a href="http://www.pillardata.com/support/professional-services/">Global Solutions (http://www.pillardata.com/support/professional-services/)</a></p>
Sales and general contact information	<a href="http://www.pillardata.com/company/contact">Company contacts (http://www.pillardata.com/company/contact)</a>
Documentation improvements and resources	<p><a href="mailto:docs@pillardata.com">docs@pillardata.com</a></p> <p><a href="http://www.pillardata.com/techdocs">Technical documents (http://www.pillardata.com/techdocs)</a> (Log in with your username and password, and select Documents.)</p>

## CHAPTER 2

# Collect System Statistics

## Download the Statistics Tools

To run the Pillar Axiom Statistics Tools, you must first download the Pillar Axiom Statistics Parser and Pillar Axiom Statistics Formatter software.

Perform this task on the workstation from which you will manage the Pillar Axiom storage system.

**Note:** The statistics tools run on either Windows or Linux.

- 1 Log in to the Pillar Axiom Storage Services Manager (GUI).
- 2 From the **Support** tab, click **Utilities**.
- 3 Choose a download option to match your client workstation operating system from the Statistics Tool list in the content pane.

Choose one of:

- **Pillar Statistics Tool for Windows**
  - **Pillar Statistics Tool for Linux**
- 4 Follow the prompts to download the software.
  - 5 Extract the contents to a directory of your choosing where you expect to be working with the statistics data files.
    - For Linux, use `tar` to extract the files from the downloaded \*.tgz archive file.
    - For Windows, use a Zip utility to extract the files from the downloaded \*.zip archive file.

**Tip:** Some statistical data files may be large, so select a location that has at least 200 MB of storage space.

To use the statistics tools, you first need to collect and download Pillar Axiom statistics. See [Collect and Download System Statistics](#).

## System Statistics Process Overview

To obtain Pillar Axiom system statistics for use with your analysis tools, you will need to collect, download, extract, process, and format the statistics. The following provides an overview of the process.

- 1 [Download the Statistics Tools.](#)  
**Note:** This is a one-time action.
- 2 [Collect and Download System Statistics.](#)
- 3 [Extract System Statistics.](#)
- 4 [Run the Pillar Axiom Statistics Parser.](#)
- 5 [Run the Pillar Axiom Statistics Formatter.](#)

After you have processed and formatted the statistics, you can import them into a tool such as Microsoft Excel for statistical analysis.

## Collect and Download System Statistics

System statistics are collected and downloaded from the Pillar Axiom Storage Services Manager (GUI).

Collect and download the system statistics on the Pillar Axiom storage system of interest.

- 1 Log in to the Pillar Axiom Storage Services Manager (GUI).
- 2 From the **Support** tab, click **Tools > System Logs**.
- 3 Choose **Create Log Bundle** from the **Actions** menu.

Result:

The Create Log Bundle dialog box displays with all of the components selected for data collection.

- 4 Click **Deselect All**.
- 5 In the Collect column, select **Yes** beside **Statistics**.
- 6 Select a collection period.
  - **Most Recent Logs**: Choose the extent of the collection period in hours or days.
  - **All Logs**: Collects all available logs regardless of time constraints.
- 7 Click **OK**.
- 8 Select the collection when it appears in the System Logs list.
- 9 Choose **Download Log Bundle** from the **Actions** menu.
- 10 Select a directory on a local drive as the **Target Download Location**, and click **OK**.

Once you have downloaded the system information collection, you need to extract the statistics from the collection. See [Extract System Statistics](#).

## Extract System Statistics

The system information collection downloaded from the Pillar Axiom Storage Services Manager (GUI) Collect System Information page is a compressed tar file containing multiple tar and bzip2 archive files, all of which must be extracted before you can use the statistics tools to process and format the statistics.

Linux users can use the Linux `tar` command to extract the files. Windows users need a tar and bzip2 utility to extract the files.

- 1 Use the following command to extract the statistics bzip2 files from the system information collection tar file:

```
tar -xf SystemInfo.tar
```

`SystemInfo.tar` is the name of the system information collection you downloaded.

- 2 Use the following commands to extract the individual data files from the bzip2 file:

```
tar -xjf ID_number.stats.tar.bz2
tar -xjf ID_number.chsh.xml.tar.bz2
```

*ID\_number* is the system-generated ID number of the data file.

**Note:** The `ID_number.stats.tar.bz2` file contains the raw statistical data from the statistics bundle, and the `ID_number.chsh.xml.tar.bz2` file identifies the statistics gathered from your Pillar Axiom storage system and displays these statistics using the names you have defined.

Result:

The `ID_number.chsh.xml.tar.bz2` file is extracted to the current directory, and a new `PillarStatistics` directory is created in the current directory. The contents of the `ID_number.stats.tar.bz2` file are extracted to the new `PillarStatistics` directory.

Once the `chsh` and `stats` files have been extracted, you need to process them with the Pillar Axiom Statistics Parser tool. See [Run the Pillar Axiom Statistics Parser](#).

## About Processing System Statistics

Before you can use the statistical data that you extracted from the system information collection, you need to run the Pillar Axiom Statistics Parser tool to process the statistics.

The Statistics Parser tool translates the extracted file to an intermediate format that facilitates access to the statistical data in the subsequent analysis phase.

## Run the Pillar Axiom Statistics Parser

Prerequisite:

Before you can process the statistics files with the Pillar Axiom Statistics Parser tool, you must extract the individual statistics files along with the *ID\_name.chsh.xml* file from the system information collection. See [Extract System Statistics](#).

**Note:** Statistical data files are downloaded to the `PillarStatistics` directory by default, so `axiomstatsparser` looks for its input files in the `PillarStatistics` directory by default.

- 1 Navigate to the directory where you extracted the statistics files.

**Note:** This directory is the parent directory of the newly-created `PillarStatistics` directory.

- 2 From a command prompt, run the `axiomstatsparser` command.
  - If the statistics files are in a location different from the default `PillarStatistics` directory, you will need to specify this location with the `-i` option.
  - To specify an output filename other than the default `axiomstats.sps`, use the `-o` option.

See [Statistics Parser Syntax](#) for command option details.

Once the output file has been created, you will need to format it with the Pillar Axiom Statistics Formatter tool. See [About Formatting System Statistics](#).

## Statistics Parser Syntax

The Pillar Axiom Statistics Parser (`axiomstatsparser`) tool translates raw statistics from the individual statistics files extracted from the system information collection into an intermediate format for the Pillar Axiom Statistics Formatter.

Use the Statistics Parser to process a statistics bundle into an intermediate format to provide quick access to the statistics data in the subsequent analysis phase. You can then format this intermediate file using the Statistics Formatter tool. See [Run the Pillar Axiom Statistics Formatter](#).

SYNTAX `axiomstatsparser [-h | -i | -o]`

OPTIONS `-h`

Displays the help man page.

`-i = INPUT_FILE_PATH`

Specifies the path to the input files.

- Default = `PillarStatistics`
- Use the default unless you extracted the statistics files to a different location.

`-o = OUTPUT_FILE_NAME`

Specifies the name of the output file.

- Default = `axiomstats.sps` in the current working directory.
- If not specified, the output defaults to the default file.

EXAMPLES Use the following command to create the `axiomstats.sps` file from the statistics files that are located in the default `PillarStatistics` directory:

```
axiomstatsparser
```

Use the following command to create a `mystats.sps` file from the statistics files that are located in the `/tmp/stats` directory:

```
axiomstatsparser -i=/tmp/stats -o=mystats.sps
```

## About Formatting System Statistics

To obtain data that spreadsheets and other applications can read directly, you need to format the statistical data processed by the Pillar Axiom Statistics Parser with the Pillar Axiom Statistics Formatter tool.

The Statistics Formatter tool takes the output of the Statistics Parser tool and converts it to comma-separated value (CSV) data. See [Statistics Formatter Syntax](#) for detailed information on the syntax and command options for the Statistics Formatter.

## Run the Pillar Axiom Statistics Formatter

Prerequisites:

Before you can run the Pillar Axiom Statistics Formatter tool, you need to collect statistics, extract the statistics files, and run the Pillar Axiom Statistics Parser tool to convert the statistics into a format that the Statistics Formatter tool can read.

- 1 Verify that the intermediate format file (default = `axiomstats.sps`) has been created.
- 2 At a command prompt, run the `axiomstatsformatter` command with any appropriate options.

See [Statistics Formatter Syntax](#) for command option details.

The statistical data is now ready for you to import into the tool of your choice for statistical analysis.

## Statistics Formatter Syntax

The Pillar Axiom Statistics Formatter (`axiomstatsformatter`) tool processes files generated by the Pillar Axiom Statistics Parser tool to generate formatted output suitable for import into Microsoft Excel or other analysis tools.

Use the Statistics Formatter tool to format a statistics file generated by the Statistics Parser tool.

**SYNTAX** `axiomstatsformatter [-c | -C | -f | -h | -H | -i | -l | -m | -n | -o | -r | -s | -t | -T | -v | -V]`

**OPTIONS** `-c=COMPONENT`

Specifies the name of the component for which statistics will be retrieved. If a subcomponent or statistics type is not specified, the statistics for all subcomponents and statistics types for this component will be retrieved.

`-C=COLUMNS`

Specifies the column names to include in the retrieved statistics. *COLUMNS* is a comma separated list of the column names to retrieve. If column names contain a space, the *COLUMNS* list must be double-quoted:

```
axiomstatsformatter -C="first name, second name, third name"
```

The `statsTime` and `duration` columns are always included and do not need to be specified.

`-f=FORMAT`

Specifies the output format. CSV (Comma-separated value) is the default format and currently the only option that can be specified, but a `.csv` extension is not automatically added to the output file name. To specify the `.csv` extension, specify an output file name using the `-o` option.

`-h`

Displays this help page.

`-H=HEADERTYPE`

Header rows specify the component, subcomponent, type, and column names in the output file by default. Specify `NONE` to hide the headers and display only data rows.

`-i=FILENAME`

Specifies the name of the file from which to read the statistics data that has been processed by `axiomstatsparser`. If no file name is specified, the input defaults to the `axiomstats.sps` file in the current working directory.

`-l`

Lists the available statistics in the statistics file. Statistics are listed by component, subcomponent, and statistics type.

`-m`

Specify this option to have a separate data file written for each component, subcomponent, and statistics type. This option applies only if the `-o` option is also used. The data files will be named with the component, subcomponent, and statistics type concatenated to the specified output file name. An output file name extension (such as `.csv`) can be specified with the file name.

`-n=NODENAME`

Specifies that only data records from this Pillar Axiom Slammer control unit or Brick will be retrieved. Specify the World-Wide Name (WWN) of the Slammer control unit or Brick that generated the statistical data you want to see.

`-o=FILENAME`

Specifies the name of the file to which to write the formatted output. If not specified, the output defaults to `stdout`. File name extensions are not automatically added to the output file name. See also the `-m` option, which may be used in conjunction with the `-o` option to separate the output by component, subcomponent, and statistics type. Note that errors are printed to `stderr`.

`-r`

Specifies that all data is displayed from the data file without any processing applied. Without the `-r` option, counter data is normalized to turn it into rates, and ID values are translated into Fully Qualified Names (FQNs) where possible. With the `-r` option, counter data is expressed as accumulated values rather than rates, and ID values will not be translated into FQNs.

`-s=NAME`

Specifies that statistics retrieved will be limited to those that match the specified subcomponent.

`-t=STATISTICSTYPE`

Must be used with the `-c` option. Specifies that statistics retrieved will be limited to those that match the specified *STATISTICSTYPE* for the specified component. *STATISTICSTYPE* must be expressed as one of the following values:

- ERROR
- GENERAL
- UI

`-T=TIME`

Specifies a time range within which to retrieve the statistics. *TIME* is specified in the following format: ***START, END***. *START* and *END* are formatted as follows:

```
MMDDYY:HH:MM:SS
```

The time is the local time of the client machine on which `axiomstatsformatter` is running.

`-v`

Prints the `axiomstatsformatter` version number.

`-V`

Specifies verbose output. While the statistics formatting process is running, status progress is printed to standard output (`stdout`). If you use verbose output, you should also use the `-o` option to send program output to a file to avoid mixing program output with progress output in `stdout`.

## EXAMPLES

Run the following command to send CSV-formatted data from the default `axiomstatsparser` output file `axiomstats.sps` to your standard output (`stdout`) device:

```
axiomstatsformatter
```

Run the following command to list the names and definitions of all the statistical values in the default `axiomstats.sps` file:

```
axiomstatsformatter -l
```

Run the following command to list the names and definitions of the statistical values for the Block Services component:

```
axiomstatsformatter -l -c=BS
```

Run the following command to send CSV-formatted data from an `axiomstatsparser` output file named `my_stats.sps` to your standard output (`stdout`) device:

```
axiomstatsformatter -i=my_stats.sps
```

Run the following command to send CSV-formatted private interconnect (PI) port statistics to a file named `pi.csv`:

```
axiomstatsformatter -c=PI -s=Port -o=pi.csv
```

Run the following command to send CSV-formatted data from the default `axiomstats.sps` file to a series of files, one for each component, subcomponent, and statistic type, while sending verbose progress output to your standard output (`stdout`) device:

```
axiomstatsformatter -m -o=mystats.csv -V
```

The files will be named `mystats_component_subcomponent_type.csv`.

Run the following command to send CSV-formatted private interconnect (PI) port statistics for the time range 10:00 to 10:05 local client time on December 1, 2008 to your standard output (`stdout`) device:

```
axiomstatsformatter -c=PI -s=Port -  
T=120108:10:00:00,120108:10:05:00
```

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