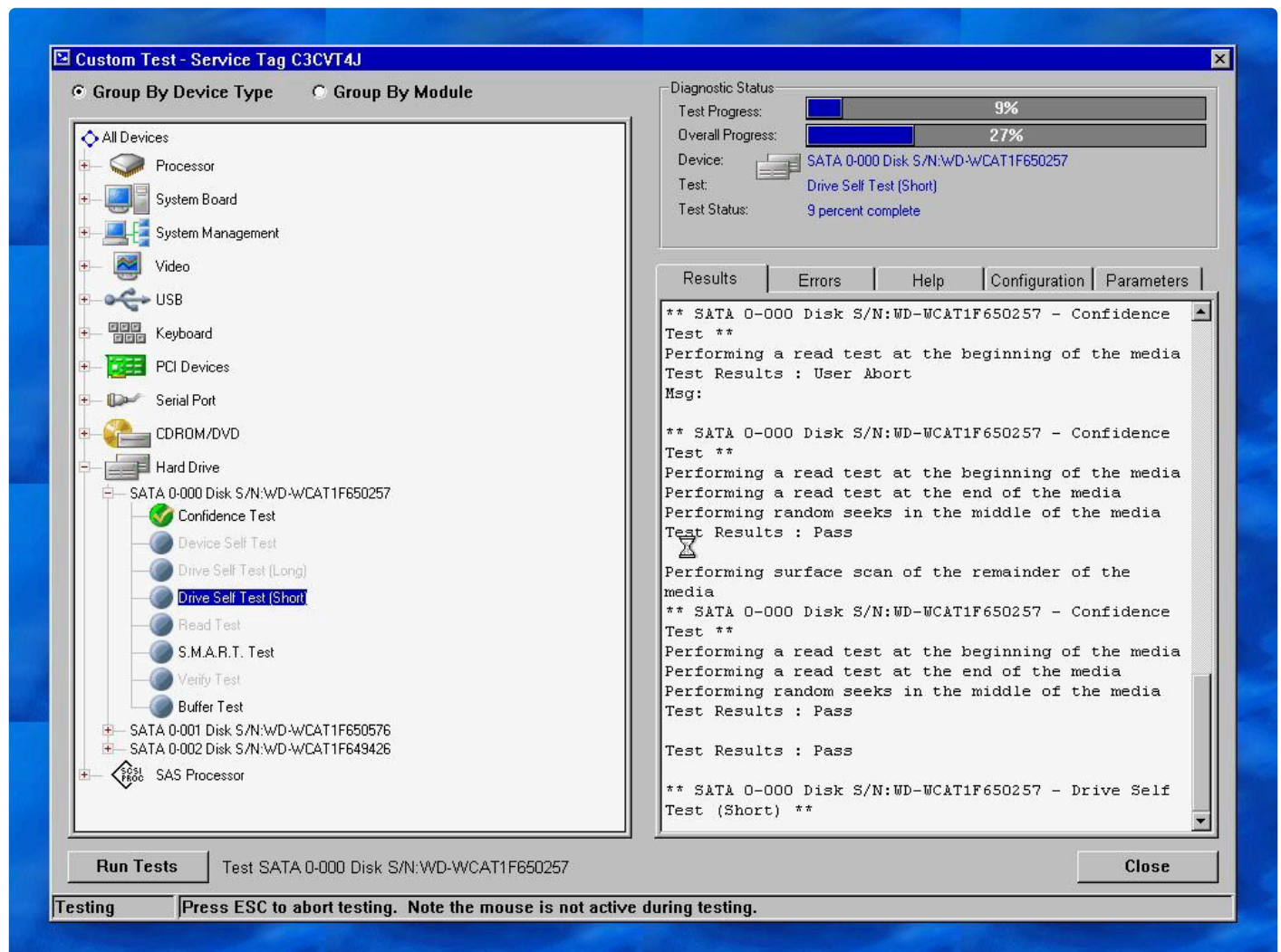


# A+ Core 1 and Core 2 CertMaster Perform 15.0

## 4.2.11 Troubleshoot Drive Reliability and Performance

In addition to symptoms that you can detect by observing system operation, most fixed disks have a self-diagnostic program called **Self-Monitoring Analysis and Reporting Technology (S.M.A.R.T.)**. S.M.A.R.T. can alert the operating system if a **failure** is detected. If you suspect a drive is failing or experience performance issues like **extended read/write times**, run advanced diagnostic tests. Most disk vendors provide utilities for testing drives, and there may also be system diagnostics programs supplied with the computer.

### Using system diagnostics software to test a hard drive



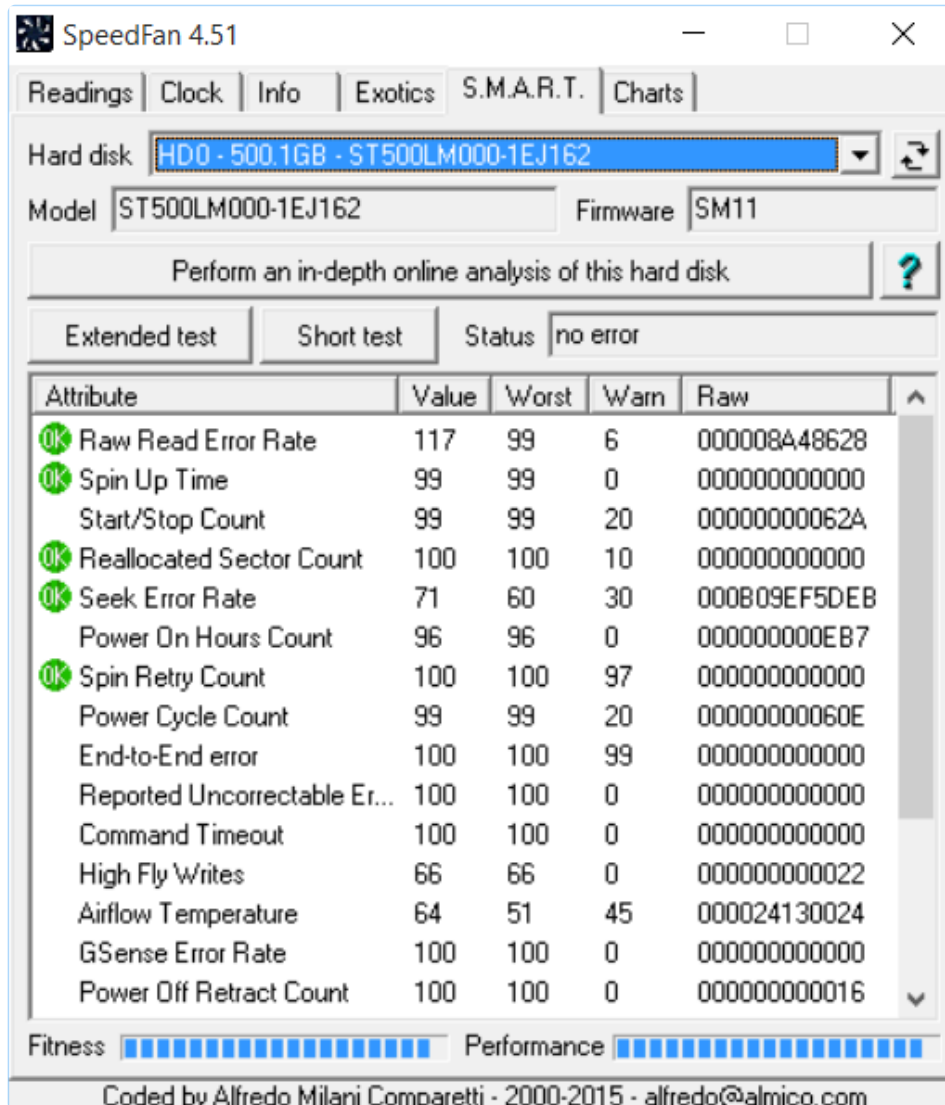
Screenshot courtesy of Microsoft.

#### ▼ Description

The service tag is C 3 C U T 4 J. Drive Self Test (Short) is highlighted under the hard drive section on the left. Diagnostic status shows 9 percent test progress with 27 percent overall progress. Device: SATA 0-000 Disk S slash N W D-W C A T 1 F 650527. Test: drive self test (Short) Test Status: 9 percent complete The panel below has heads Results, Errors, Help, Configuration, and Parameters. Results is selected.

You can also use Windows utilities to query SMART and run manual tests.

## Viewing SMART information via the SpeedFan utility



The screenshot shows the SpeedFan 4.51 utility window. The 'S.M.A.R.T.' tab is selected. The hard disk is identified as 'HDD - 500.1GB - ST500LM000-1EJ162'. The model is 'ST500LM000-1EJ162' and the firmware is 'SM11'. A button is present to 'Perform an in-depth online analysis of this hard disk'. Below this, there are tabs for 'Extended test', 'Short test', and 'Status' (showing 'no error'). A table lists SMART attributes with their current values, worst values, warn values, and raw data. At the bottom, there are 'Fitness' and 'Performance' bar graphs, and a footer credit to Alfredo Milani Comparetti.

Attribute	Value	Worst	Warn	Raw
OK Raw Read Error Rate	117	99	6	000008A48628
OK Spin Up Time	99	99	0	000000000000
Start/Stop Count	99	99	20	00000000062A
OK Reallocated Sector Count	100	100	10	000000000000
OK Seek Error Rate	71	60	30	000B09EF5DEB
Power On Hours Count	96	96	0	000000000EB7
OK Spin Retry Count	100	100	97	000000000000
Power Cycle Count	99	99	20	00000000060E
End-to-End error	100	100	99	000000000000
Reported Uncorrectable Er...	100	100	0	000000000000
Command Timeout	100	100	0	000000000000
High Fly Writes	66	66	0	000000000022
Airflow Temperature	64	51	45	000024130024
GSense Error Rate	100	100	0	000000000000
Power Off Retract Count	100	100	0	000000000016

Screenshot courtesy of Microsoft.

### ▼ Description

The model and firmware are mentioned above. A table below lists the attribute, value, worst, warn, and raw. The fitness and performance is calculated at the bottom.

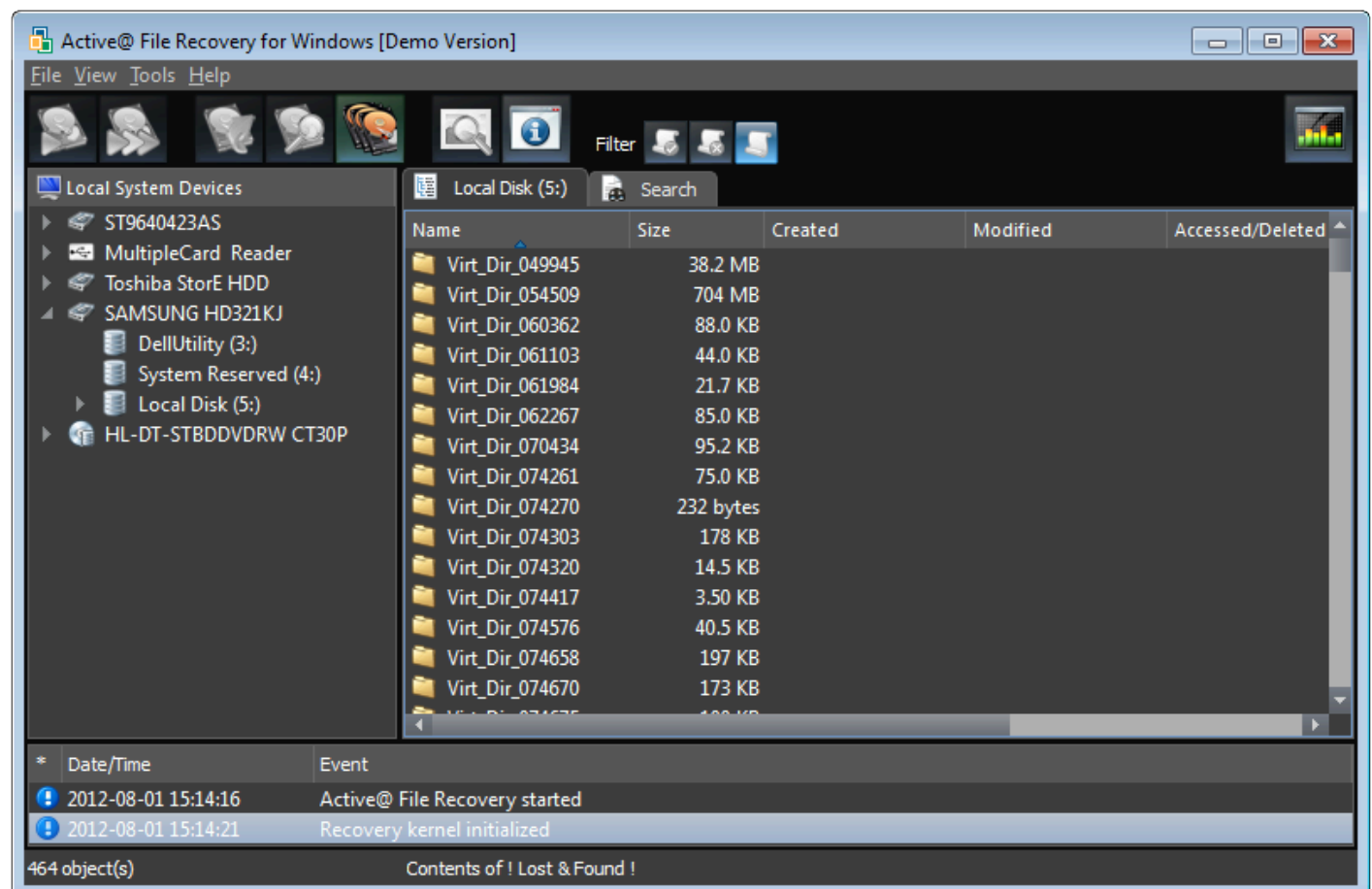
These tests can detect damage to the storage mechanisms and report statistics such as **input/output operations per second** (IOPS). If performance metrics are lower than the vendor's baseline measurements, the device is likely faulty. If metrics are similar to the benchmark, slow read/write access may be due to other system performance issues, such as:

- Application load and general system resource issues
- File fragmentation (on HDDs)
- Limited remaining capacity

Extended read/write times can also occur due to failing sectors (HDDs) or blocks (SSDs). **Data loss** or corruption means files stored in these locations cannot be opened or may disappear. When bad sectors or blocks are detected, the disk firmware marks them as unavailable for use.

If there is file corruption on a hard disk and no backup, you can attempt to recover data using a recovery utility.

## Using file recovery software to scan a disk



Screenshot courtesy of Microsoft.

### ▼ Description

A table on the right lists the name, size, created, modified, and accessed or deleted details. Another table at the bottom lists the date, time, and event.



File recovery from an SSD is not usually possible without highly specialized tools.

Copyright © CompTIA, Inc. All rights reserved.